

05-30-07

**CANCELLED**  
MAY 3 2007  
U.S. PATENT AND TRADEMARK OFFICE

Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

# **FEE TRANSMITTAL** **For FY 2006**

Complete if Known	
Application Number	09/884,528
Filing Date	June 19, 2001
First Named Inventor	Oleg WASYNCZUK
Examiner Name	Ayal I. Sharon
Art Unit	2123
Attorney Docket No.	31122-8

☒ Applicant claims small entity status. See 37 CFR 1.27

**TOTAL AMOUNT OF PAYMENT** (\$250.00)

## **METHOD OF PAYMENT (check all that apply)**

☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): \_\_\_\_\_

☒ Deposit Account Deposit Account number: 23-3030 Deposit Account Name: Woodard, Emhardt, Moriarty, McNett & Henry LLP

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee

☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments.

**WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

## **FEE CALCULATION**

### **1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

### **2. EXCESS CLAIM FEES**

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee (\$)	Fee Paid (\$)	Multiple Dependent Claims Fee (\$)	Fee Paid (\$)
-20 or HP	=-20	x	=0	x	=0

HP = highest number of total claims paid for, if greater than 20

Independent Claims	Extra Claims	Fee (\$)	Fee Paid (\$)
-3 or HP	=-3	x	=0

HP = highest number of independent claims paid for, if greater than 3

### **3. APPLICATION SIZE FEE**


If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 C.F.R. 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
-100	=	/50 = (round up to a whole number)	x	0

### **4. OTHER FEE(S)**

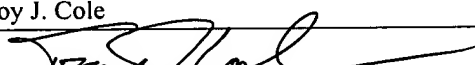
Brief in support of Appeal	Fee Paid (\$)
	\$250.00

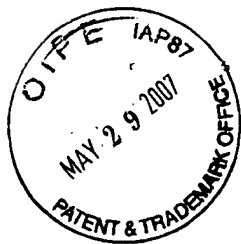
### **SUBMITTED BY**

Signature		Registration No. (Attorney/Agent)	35,102	Telephone	(317) 634-3456
Name (Print/Type)	Troy J. Cole	Date	May 29, 2007		

### **CERTIFICATE OF MAILING OR TRANSMISSION**

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as express mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or facsimile transmitted to the U.S. Patent and Trademark Office on:

Name (Print/Type)	Troy J. Cole		
Signature		Date	May 29, 2007



IN THE UNITED STATES PATENT OFFICE

In re patent application of: )  
 )  
Oleg Wasynczuk et al. ) Before the Examiner  
 ) Ayal I. Sharon  
Application No. 09/884,528 )  
 ) Group Art Unit 2123  
Filed: June 19, 2001 )  
 ) May 29, 2007  
DISTRINUTED SIMULATION )  
 )

**APPEAL BRIEF**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Pursuant to the Notice of Appeal submitted to the United States Patent Office on March 28, 2007 in connection with the above-indicated application, an Appeal Brief according to 37 CFR §41.37 is provided along with the requisite fee of \$250.00 for a small entity. The Commissioner is authorized to grant any further extensions of time, and charge any deficiency or credit any overpayment to Deposit Account No. 23-3030, but not to include issue fees.

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**I. REAL PARTY IN INTEREST**  
(37 CFR §41.37(c)(1)(i))

The real party in interest in this appeal is P.C. Krause and Associates, Inc., which is the owner of the present application by written assignment recorded at reel/frame number 011918/0748.



## **II. RELATED APPEALS AND INTERFERENCES**

(37 CFR §41.37(c)(1)(ii))

The applicants, the applicants' legal representative, and the assignee are unaware of any related appeals or interferences which will affect, be directly affected by, or have a bearing on the Appeal Board's decision in the present appeal.

### **III. STATUS OF CLAIMS**

(37 CFR §41.37(c)(1)(iii))

#### **A. TOTAL NUMBER OF CLAIMS IN APPLICATION**

Claims in the application are 36.

#### **B. STATUS OF ALL THE CLAIMS**

1. Claims canceled: 14, 15, 21-23, 27, 28, 30
2. Claims withdrawn from consideration but not canceled: none
3. Claims allowed: none
4. Claims rejected: 1-13, 16-20, 24-26, 29, 31-44
5. Claims objected to: none

#### **C. CLAIMS ON APPEAL**

The claims on appeal are: 1-13, 16-20, 24-26, 29, 31-44

#### **IV. STATUS OF AMENDMENTS**

(37 CFR §41.37(c)(1)(iv))

No amendments have been filed after the date of the Final Office Action mailed December 5, 2006.

## **V. SUMMARY OF CLAIMED SUBJECT MATTER**

(37 CFR §41.37(c)(1)(v))

The following summarization explains how each of the independent claims reads on one or more embodiments of the present application. In this summarization, all figure designations refer to the present application, and all page and line numbers refer to the corresponding text of the present application. It should be appreciated that the below summaries are to be interpreted as merely nonlimiting examples--it being understood that all other embodiments upon which the claims read are also intended to be covered.

### **A. Independent Claim 1**

Independent claim 1 sets forth a computer-implemented system that reads on several embodiments of the present application. For instance, the system includes a first executing process that implements a first continuous-time model to simulate a first physical subsystem, and a second executing process that implements a second continuous-time model to simulate a second physical subsystem (see page 6, paragraph 19 through page 7, paragraph 22 and FIGs. 1-3). The first process sends a series of state-related numerical values to the second process without the values passing through a central communication process (see page 7, paragraph 22; page 13, paragraph 40 and FIG. 4).

### **B. Independent Claim 9**

Independent claim 9 sets forth a computer-implemented method that reads on several embodiments of the present application. For instance, the method includes simulating a first physical subsystem using a first continuous-time simulation, and simulating a second physical subsystem using a second continuous-time simulation (see page 6, paragraph 19 through page 7, paragraph 22 and FIGs. 1-3). The first process sends a series of state-related numerical values to the second process without the values passing through a central communication process (see page 7, paragraph 22; page 13, paragraph 40 and FIG. 4).

**C. Independent Claim 39**

Independent claim 39 sets forth a computer-implemented system that reads on several embodiments of the present application. For instance, the system includes a plurality of computing devices, each simulating a subsystem of a physical system, where the simulations send and/or receive state-related data, wherein the simulation occurs at a speed greater than  $O(n)$  times the speed of the simulation using a single one of the computing devices (see page 6, paragraph 19 through page 7, paragraph 22 and FIGs. 1-3; page 7, paragraph 22; page 13, paragraph 40 and FIG. 4).

**D. Independent Claim 40**

Independent claim 40 sets forth a computer-implemented method that reads on several embodiments of the present application. For instance, the method includes simulating a physical system on a plurality of computing devices and outputting data representative of a state of the physical system simulation, wherein the simulation occurs at a speed greater than  $O(n)$  times the speed of the simulation using a single one of the computing devices (see page 6, paragraph 19 through page 7, paragraph 22 and FIGs. 1-3; page 7, paragraph 22; page 13, paragraph 40 and FIG. 4).

**VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

(37 CFR § 41.37(c)(vi))

A concise statement of each ground of rejection presented for review is provided below.

**A. WHETHER CLAIMS 1-13, 16-20, 24-26 AND 29-42 ARE UNPATENTABLE UNDER 35 U.S.C. §101, AS BEING DIRECTED TOWARD NON-STATUTORY SUBJECT MATTER.**

**B. WHETHER CLAIMS 1-13, 19-20, 25-26, 29, 32-33 AND 39-44 ARE UNPATENTABLE UNDER 35 U.S.C. §103 OVER DMSO FACILITY REFERENCE IN VIEW OF OMG CORBA REFERENCE.**

**C. WHETHER CLAIMS 24 AND 36-38 ARE UNPATENTABLE UNDER 35 U.S.C. §103 OVER DMSO FACILITY REFERENCE IN VIEW OF OMG CORBA REFERENCE AND FURTHER IN VIEW OF OFFICIAL NOTICE.**

## VII. ARGUMENT

(37 CFR § 41.37(c)(vii))

The contentions of the applicant and the basis for those contentions with respect to each ground of rejection is presented below.

### A. REJECTIONS UNDER 35 U.S.C. §101

#### 1. Claims 1-8 and 29-33

Claims 1-8 and 29-33 were rejected under 35 U.S.C. §101 for allegedly lacking a “concrete, tangible and useful result” (Final Office Action, ¶¶10-18). Applicants respectfully traverse. Independent Claim 1 specifically recites “a second executing process that. . . implements a second continuous-time model to simulate a second physical subsystem. . . and outputs data representative of a state of the second continuous-time model.” Claim 1 has further been amended herein to make it clear that both the first and second subsystems are “physical subsystems.” The system of claim 1 therefore produces a concrete, tangible and useful result, namely data representing the state of a computer-simulated physical subsystem. It will be appreciated that this is directly analogous to the allowable result produced in State Street Bank & Trust Co. v. Signature Financial Group, 149 F.3d 1368 (Fed. Cir. Jul. 23, 1998) (a computer-calculated price for one share of a mutual fund). Both the presently claimed invention and the system discussed in State Street use a computer to model a real world thing (physical subsystems or mutual funds), use mathematical operations to determine some descriptive aspect of that real-world thing (state of the physical subsystem or share price of the mutual fund), and then output this descriptive aspect. It is therefore believed that claim 1 is allowable under 35 U.S.C. §101.

Claims 2-8 and 29-33 depend from Claim 1 and therefore include all of the limitations of Claim 1. Applicants therefore respectfully submit that claims 2-8 and 29-33 are allowable under 35 U.S.C. §101 for at least the same reasons presented hereinabove with respect to Claim 1.

## **2. Claims 9-13, 16-20, 24-26 and 34-38**

Claims 9-13, 16-20, 24-26 and 34-38 were rejected under 35 U.S.C. §101 for allegedly lacking a “concrete, tangible and useful result” (Final Office Action, ¶¶10-18). Applicants respectfully traverse. Independent Claim 9 specifically recites “simulating a second physical subsystem with a second continuous-time model. . . and outputting data representative of a state of the second continuous-time simulation.” Claim 9 makes it clear that both the first and second subsystems are “physical subsystems.” The system of claim 9 therefore produces a concrete, tangible and useful result, namely data representing the state of a computer-simulated physical subsystem. It will be appreciated that this is directly analogous to the allowable result produced in State Street Bank & Trust Co. v. Signature Financial Group, 149 F.3d 1368 (Fed. Cir. Jul. 23, 1998) (a computer-calculated price for one share of a mutual fund). Both the presently claimed invention and the system discussed in State Street use a computer to model a real world thing (physical subsystems or mutual funds), use mathematical operations to determine some descriptive aspect of that real-world thing (state of the physical subsystem or share price of the mutual fund), and then output this descriptive aspect. It is therefore believed that claim 9 is allowable under 35 U.S.C. §101.

Claims 10-13, 16-20, 24-26 and 34-38 depend from Claim 9 and therefore include all of the limitations of Claim 9. Applicants therefore respectfully submit that claims 10-13, 16-20,



24-26 and 34-38 are allowable under 35 U.S.C. §101 for at least the same reasons presented hereinabove with respect to Claim 9.

### **3. Claims 39, 43 and 44**

Claims 39, 43 and 44 were rejected under 35 U.S.C. §101 for allegedly lacking a “concrete, tangible and useful result” (Final Office Action, ¶¶10-18). Applicants respectfully traverse. Independent Claim 39 specifically recites “A computer-implemented system for simulating a physical system, the physical system comprising two or more subsystems. . . and the computing system provides an output signal from at least one of the subsystem simulations” Claim 39 makes it clear that the computer is modeling a “physical system.” The system of claim 39 therefore produces a concrete, tangible and useful result, namely data representing the state of a computer-simulated physical subsystem. It will be appreciated that this is directly analogous to the allowable result produced in State Street Bank & Trust Co. v. Signature Financial Group, 149 F.3d 1368 (Fed. Cir. Jul. 23, 1998) (a computer-calculated price for one share of a mutual fund). Both the presently claimed invention and the system discussed in State Street use a computer to model a real world thing (physical subsystems or mutual funds), use mathematical operations to determine some descriptive aspect of that real-world thing (state of the physical subsystem or share price of the mutual fund), and then output this descriptive aspect. It is therefore believed that claim 9 is allowable under 35 U.S.C. §101.

Claims 43 and 44 depend from Claim 39 and therefore include all of the limitations of Claim 39. Applicants therefore respectfully submit that claims 43 and 44 are allowable under 35 U.S.C. §101 for at least the same reasons presented hereinabove with respect to Claim 39.

#### **4. Claims 40-42**

Claims 40-42 were rejected under 35 U.S.C. §101 for allegedly lacking a “concrete, tangible and useful result” (Final Office Action, ¶¶10-18). Applicants respectfully traverse. Independent Claim 40 specifically recites “a continuous-time simulation of the physical system. . . outputting data representative of a state of the physical system.” Claim 40 makes it clear that the computer is modeling a “physical system.” The system of claim 40 therefore produces a concrete, tangible and useful result, namely data representing the state of a computer-simulated physical system. It will be appreciated that this is directly analogous to the allowable result produced in State Street Bank & Trust Co. v. Signature Financial Group, 149 F.3d 1368 (Fed. Cir. Jul. 23, 1998) (a computer-calculated price for one share of a mutual fund). Both the presently claimed invention and the system discussed in State Street use a computer to model a real world thing (physical systems or mutual funds), use mathematical operations to determine some descriptive aspect of that real-world thing (state of the physical system or share price of the mutual fund), and then output this descriptive aspect. It is therefore believed that claim 40 is allowable under 35 U.S.C. §101.

Claims 41 and 42 depend from Claim 40 and therefore include all of the limitations of Claim 40. Applicants therefore respectfully submit that claims 41 and 42 are allowable under 35 U.S.C. §101 for at least the same reasons presented hereinabove with respect to Claim 40.

#### **B. REJECTION UNDER 35 U.S.C. §103 OVER DMSO FACILITY REFERENCE, OMG CORBA REFERENCE, AND OFFICIAL NOTICE**

## **1. Claims 1-8, 29 and 31-33**

### **a. ORB CORBA is a “Central Communication Process”**

The Examiner has relied upon OMG CORBA’s Object Request Broker (ORB) as corresponding to a means for transmitting state-related numerical values between two simulation programs without passing through a central process. Support for this conclusion is based entirely upon the Office Action’s unsupported assertion that “Examiner interprets that CORBA is decentralized, and therefore does not correspond to the claimed ‘central communication process.’” (Final Office Action ¶25) No support is given for this conclusory statement. Applicants respectfully point out that OMG CORBA’s ORB is not a simulation process, therefore if all of the state-related numerical values passed between the simulation processes must pass through the ORB, then the ORB is a “central communication process” within the meaning of that term in Applicants’ claims. As can be clearly seen in FIGs 1 and 2 of the OMG CORBA reference, all data on the system must pass through an ORB.

### **b. ORB CORBA Reference is Not Prior Art**

Furthermore, it is respectfully submitted that the OMG CORBA reference is not prior art. The OMG CORBA reference is dated November 12, 2004. The present application has a priority date of June 19, 2000. Therefore, the OMG CORBA reference is not available as prior art and its use in the present rejection under 35 U.S.C. §103 is improper. The Examiner alleges “[t]he reference has the following copyright dates: ©1997-2004. Therefore, the date of the reference is 1997” (Final Office Action ¶49). It is respectfully submitted that the copyright dates

indicate that some of the material in the reference dates to 1997, while other material in the reference dates to 2004, hence the need to claim a copyright date of 2004 for some of the material. Because the reference does not indicate what portion of its content may have been published before applicant's priority date of 6/19/00, and because some portion of its contents was published in 2004 (four years after Applicants' priority date), the ORB CORBA reference cannot be relied upon by the Examiner as prior art.

**c. The Claimed Invention has Enjoyed Substantial Commercial Success**

Applicants, with their Amendment filed 01/17/06, submitted a Declaration of Dr. Paul C. Krause containing evidence of strong commercial success of a product corresponding to the present claims. This evidence was not considered by the Examiner. Instead, the Examiner simply stated "Examiner acknowledges Dr. Krause's Declaration, which provides evidence of commercial success. However, the claims are not currently in condition for allowance." (1/17/06 Office Action ¶63). It is respectfully submitted that evidence of commercial success of the claimed invention is relevant to rebut an obviousness rejection under 35 U.S.C. §103. Since the Office Action contained an obviousness rejection under 35 U.S.C. §103, it was improper for the Examiner to not consider such evidence. "[E]vidence on these secondary considerations is to be taken into account always" *Cable Elec. Prods., Inc. v. Genmark, Inc.*, 226 USPQ 881 (Fed. Cir. 1985). "Commercial success abroad, as well as in the United States, is relevant in resolving the issue of nonobviousness." *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984). For convenience, Applicants are re-

presenting hereinbelow their original arguments relating to commercial success, and the Examiner is requested to consider same.

**i. Evidence of Commercial Success of the Present Invention**

Applicants have established above that the present invention is not rendered obvious by the references relied upon in the Office Action. Applicants have also submitted (with the Amendment filed 01/17/06) evidence concerning objective indicia of non-obviousness. Accompanying that response was the Declaration of Dr. Paul C. Krause (“Krause”). This declaration demonstrates the commercial success of the invention and the risk of copying by competitors, and identifies the problems existing in the art that the invention solves.

As explained further in the declarations, P.C. Krause and Associates, Inc., owner of the present application, makes and sells products that correspond to the claims at issue (the “covered products”). Krause, ¶¶ 4-5. The covered products have enjoyed outstanding commercial success. Krause, ¶¶ 6-10 and 17. In a market comprised of extremely technically sophisticated customers, see Krause, ¶ 11, the covered products have sold to some of the largest aerospace companies in the world. Krause, ¶ 7.

The covered products are purchased due to their superior performance over competing products. Krause, ¶ 11. Particularly, the covered products allow distributed simulation of physical systems to run on separate computers (or separate processes on the same computer) or in different languages. Krause, ¶ 5. The covered products allow an extremely large improvement in simulation speed as compared to other known techniques, see Krause, ¶¶ 5, 13 and 16, a result disclosed and claimed in the present application. An extremely sophisticated aerospace company has written an article detailing the large speed increase obtained using the

covered products and describing them as “new” and “significant improvements.” Krause, ¶ 13. These results were published in the prestigious technical journal *Aerospace Engineering*. Krause ¶ 13. Similarly, the Air Force Research Laboratory featured the covered product in their *Technology Horizons* magazine, reporting a 981-fold speed increase through the use of the covered product. Krause, ¶ 15. Air Force personnel reported in this magazine that use of the covered product allowed simulation “at a level of detail not before possible.” Krause, ¶ 16.

The commercial success of the covered products is due to the structure and function claimed in the present application, not due to extrinsic sources such as advertising changes or escalation, reduction of prices or opening of new markets. Krause, ¶ 11.

Further, the covered products solve the simulation speed problems present in competing products and prior art references. Krause, ¶¶ 13, 16. The solution to these problems is found in the features disclosed and claimed in the present application. Krause, ¶ 5. Given the competitiveness of the market and the improved structure and function of the covered products, it is believed that the covered products would be copied if competitors were assured that no patent protection was available for the covered products. Krause, ¶ 19.

Consequently, there is substantial evidence of non-obviousness in the commercial success of the covered products, the problems it solves, and the risk of copying by competitors. The objective evidence presented herewith should be considered by the Examiner, and it is respectfully maintained that that evidence warrants a conclusion of non-obviousness in and of itself. Given the deficiencies of the cited references as well, it is believed that the claims of the present application are clearly allowable.

For all of the above reasons, it is respectfully submitted that claims 1-8, 29 and 31-33 are allowable under 35 U.S.C. §103.

**2. Claims 9-13, 16-20, 24, 25, 34-38**

**a. ORB CORBA is a “Central Communication Process”**

The Examiner has relied upon OMG CORBA’s Object Request Broker (ORB) as corresponding to a means for transmitting state-related numerical values between two simulation programs without passing through a central process. Support for this conclusion is based entirely upon the Office Action’s unsupported assertion that “Examiner interprets that CORBA is decentralized, and therefore does not correspond to the claimed ‘central communication process.’” (Final Office Action ¶25) No support is given for this conclusory statement. Applicants respectfully point out that OMG CORBA’s ORB is not a simulation process, therefore if all of the state-related numerical values passed between the simulation processes must pass through the ORB, then the ORB is a “central communication process” within the meaning of that term in Applicants’ claims. As can be clearly seen in FIGs 1 and 2 of the OMG CORBA reference, all data on the system must pass through an ORB.

**b. ORB CORBA Reference is Not Prior Art**

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art and its use in the present rejection under 35 U.S.C. §103 is improper. The Examiner alleges “[t]he reference has the following copyright dates: ©1997-2004. Therefore, the date of the reference is 1997” (Final Office Action ¶49). It is respectfully submitted that the copyright dates indicate that some of the material in the reference dates to 1997, while other material in the reference dates to 2004, hence the need to claim a copyright date of 2004 for some of the material. Because the reference does not indicate what portion of its content may have been published before applicant’s priority date of 6/19/00, and because some portion of its contents was published in 2004 (four years after Applicants’ priority date), the ORB CORBA reference cannot be relied upon by the Examiner as prior art.

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and 16, a result disclosed and claimed in the present application. An extremely sophisticated aerospace company has written an article detailing the large speed increase obtained using the covered products and describing them as “new” and “significant improvements.” Krause, ¶ 13. These results were published in the prestigious technical journal *Aerospace Engineering*. Krause ¶ 13. Similarly, the Air Force Research Laboratory featured the covered product in their *Technology Horizons* magazine, reporting a 981-fold speed increase through the use of the covered product. Krause, ¶ 15. Air Force personnel reported in this magazine that use of the covered product allowed simulation “at a level of detail not before possible.” Krause, ¶ 16.

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For all of the above reasons, it is respectfully submitted that claims 9-13, 16-20, 24, 25, 34-38 are allowable under 35 U.S.C. §103.

### **3. Claims 39, 43 and 44**

#### **a. ORB CORBA is a “Central Communication Process”**

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#### **b. ORB CORBA Reference is Not Prior Art**

Furthermore, it is respectfully submitted that the OMG CORBA reference is not prior art. The OMG CORBA reference is dated November 12, 2004. The present application has a priority date of June 19, 2000. Therefore, the OMG CORBA reference is not available as prior art and its use in the present rejection under 35 U.S.C. §103 is improper. The Examiner alleges “[t]he reference has the following copyright dates: ©1997-2004. Therefore, the date of the reference is 1997” (Final Office Action ¶49). It is respectfully submitted that the copyright dates indicate that some of the material in the reference dates to 1997, while other material in the reference dates to 2004, hence the need to claim a copyright date of 2004 for some of the material. Because the reference does not indicate what portion of its content may have been published before applicant’s priority date of 6/19/00, and because some portion of its contents was published in 2004 (four years after Applicants’ priority date), the ORB CORBA reference cannot be relied upon by the Examiner as prior art.

**c. The Claimed Invention has Enjoyed Substantial Commercial Success**

Applicants, with their Amendment filed 01/17/06, submitted a Declaration of Dr. Paul C. Krause containing evidence of strong commercial success of a product corresponding to the present claims. This evidence was not considered by the Examiner. Instead, the Examiner simply stated “Examiner acknowledges Dr. Krause’s Declaration, which provides evidence of commercial success. However, the claims are not currently in condition for allowance.” (1/17/06 Office Action ¶63). It is respectfully submitted that evidence of commercial success of the claimed invention is relevant to rebut an obviousness rejection under 35 U.S.C. §103. Since the Office Action contained an obviousness rejection under 35 U.S.C. §103, it was improper for

the Examiner to not consider such evidence. “[E]vidence on these secondary considerations is to be taken into account always” *Cable Elec. Prods., Inc. v. Genmark, Inc.*, 226 USPQ 881 (Fed. Cir. 1985). “Commercial success abroad, as well as in the United States, is relevant in resolving the issue of nonobviousness.” *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984). For convenience, Applicants are re-presenting hereinbelow their original arguments relating to commercial success, and the Examiner is requested to consider same.

**i. Evidence of Commercial Success of the Present Invention**

Applicants have established above that the present invention is not rendered obvious by the references relied upon in the Office Action. Applicants have also submitted (with the Amendment filed 01/17/06) evidence concerning objective indicia of non-obviousness. Accompanying that response was the Declaration of Dr. Paul C. Krause (“Krause”). This declaration demonstrates the commercial success of the invention and the risk of copying by competitors, and identifies the problems existing in the art that the invention solves.

As explained further in the declarations, P.C. Krause and Associates, Inc., owner of the present application, makes and sells products that correspond to the claims at issue (the “covered products”). Krause, ¶¶ 4-5. The covered products have enjoyed outstanding commercial success. Krause, ¶¶ 6-10 and 17. In a market comprised of extremely technically sophisticated customers, see Krause, ¶ 11, the covered products have sold to some of the largest aerospace companies in the world. Krause, ¶ 7.

The covered products are purchased due to their superior performance over competing products. Krause, ¶ 11. Particularly, the covered products allow distributed simulation of

physical systems to run on separate computers (or separate processes on the same computer) or in different languages. Krause, ¶ 5. The covered products allow an extremely large improvement in simulation speed as compared to other known techniques, see Krause, ¶¶ 5, 13 and 16, a result disclosed and claimed in the present application. An extremely sophisticated aerospace company has written an article detailing the large speed increase obtained using the covered products and describing them as “new” and “significant improvements.” Krause, ¶ 13. These results were published in the prestigious technical journal *Aerospace Engineering*. Krause ¶ 13. Similarly, the Air Force Research Laboratory featured the covered product in their *Technology Horizons* magazine, reporting a 981-fold speed increase through the use of the covered product. Krause, ¶ 15. Air Force personnel reported in this magazine that use of the covered product allowed simulation “at a level of detail not before possible.” Krause, ¶ 16.

The commercial success of the covered products is due to the structure and function claimed in the present application, not due to extrinsic sources such as advertising changes or escalation, reduction of prices or opening of new markets. Krause, ¶ 11.

Further, the covered products solve the simulation speed problems present in competing products and prior art references. Krause, ¶¶ 13, 16. The solution to these problems is found in the features disclosed and claimed in the present application. Krause, ¶ 5. Given the competitiveness of the market and the improved structure and function of the covered products, it is believed that the covered products would be copied if competitors were assured that no patent protection was available for the covered products. Krause, ¶ 19.

Consequently, there is substantial evidence of non-obviousness in the commercial success of the covered products, the problems it solves, and the risk of copying by competitors.

The objective evidence presented herewith should be considered by the Examiner, and it is

respectfully maintained that that evidence warrants a conclusion of non-obviousness in and of itself. Given the deficiencies of the cited references as well, it is believed that the claims of the present application are clearly allowable.

For all of the above reasons, it is respectfully submitted that claims 39, 43 and 44 are allowable under 35 U.S.C. §103.

#### **4. Claims 40-42**

##### **a. ORB CORBA is a “Central Communication Process”**

The Examiner has relied upon OMG CORBA’s Object Request Broker (ORB) as corresponding to a means for transmitting state-related numerical values between two simulation programs without passing through a central process. Support for this conclusion is based entirely upon the Office Action’s unsupported assertion that “Examiner interprets that CORBA is decentralized, and therefore does not correspond to the claimed ‘central communication process.’” (Final Office Action ¶25) No support is given for this conclusory statement. Applicants respectfully point out that OMG CORBA’s ORB is not a simulation process, therefore if all of the state-related numerical values passed between the simulation processes must pass through the ORB, then the ORB is a “central communication process” within the meaning of that term in Applicants’ claims. As can be clearly seen in FIGs 1 and 2 of the OMG CORBA reference, all data on the system must pass through an ORB.

**b. ORB CORBA Reference is Not Prior Art**

Furthermore, it is respectfully submitted that the OMG CORBA reference is not prior art. The OMG CORBA reference is dated November 12, 2004. The present application has a priority date of June 19, 2000. Therefore, the OMG CORBA reference is not available as prior art and its use in the present rejection under 35 U.S.C. §103 is improper. The Examiner alleges “[t]he reference has the following copyright dates: ©1997-2004. Therefore, the date of the reference is 1997” (Final Office Action ¶49). It is respectfully submitted that the copyright dates indicate that some of the material in the reference dates to 1997, while other material in the reference dates to 2004, hence the need to claim a copyright date of 2004 for some of the material. Because the reference does not indicate what portion of its content may have been published before applicant’s priority date of 6/19/00, and because some portion of its contents was published in 2004 (four years after Applicants’ priority date), the ORB CORBA reference cannot be relied upon by the Examiner as prior art.

**c. The Claimed Invention has Enjoyed Substantial Commercial Success**

Applicants, with their Amendment filed 01/17/06, submitted a Declaration of Dr. Paul C. Krause containing evidence of strong commercial success of a product corresponding to the present claims. This evidence was not considered by the Examiner. Instead, the Examiner simply stated “Examiner acknowledges Dr. Krause’s Declaration, which provides evidence of commercial success. However, the claims are not currently in condition for allowance.”

(1/17/06 Office Action ¶63). It is respectfully submitted that evidence of commercial success of



the claimed invention is relevant to rebut an obviousness rejection under 35 U.S.C. §103. Since the Office Action contained an obviousness rejection under 35 U.S.C. §103, it was improper for the Examiner to not consider such evidence. “[E]vidence on these secondary considerations is to be taken into account always” *Cable Elec. Prods., Inc. v. Genmark, Inc.*, 226 USPQ 881 (Fed. Cir. 1985). “Commercial success abroad, as well as in the United States, is relevant in resolving the issue of nonobviousness.” *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984). For convenience, Applicants are re-presenting hereinbelow their original arguments relating to commercial success, and the Examiner is requested to consider same.

**i. Evidence of Commercial Success of the Present Invention**

Applicants have established above that the present invention is not rendered obvious by the references relied upon in the Office Action. Applicants have also submitted (with the Amendment filed 01/17/06) evidence concerning objective indicia of non-obviousness. Accompanying that response was the Declaration of Dr. Paul C. Krause (“Krause”). This declaration demonstrates the commercial success of the invention and the risk of copying by competitors, and identifies the problems existing in the art that the invention solves.

As explained further in the declarations, P.C. Krause and Associates, Inc., owner of the present application, makes and sells products that correspond to the claims at issue (the “covered products”). Krause, ¶¶ 4-5. The covered products have enjoyed outstanding commercial success. Krause, ¶¶ 6-10 and 17. In a market comprised of extremely technically sophisticated customers, see Krause, ¶ 11, the covered products have sold to some of the largest aerospace companies in the world. Krause, ¶ 7.

The covered products are purchased due to their superior performance over competing products. Krause, ¶ 11. Particularly, the covered products allow distributed simulation of physical systems to run on separate computers (or separate processes on the same computer) or in different languages. Krause, ¶ 5. The covered products allow an extremely large improvement in simulation speed as compared to other known techniques, see Krause, ¶¶ 5, 13 and 16, a result disclosed and claimed in the present application. An extremely sophisticated aerospace company has written an article detailing the large speed increase obtained using the covered products and describing them as “new” and “significant improvements.” Krause, ¶ 13. These results were published in the prestigious technical journal *Aerospace Engineering*. Krause ¶ 13. Similarly, the Air Force Research Laboratory featured the covered product in their *Technology Horizons* magazine, reporting a 981-fold speed increase through the use of the covered product. Krause, ¶ 15. Air Force personnel reported in this magazine that use of the covered product allowed simulation “at a level of detail not before possible.” Krause, ¶ 16.

The commercial success of the covered products is due to the structure and function claimed in the present application, not due to extrinsic sources such as advertising changes or escalation, reduction of prices or opening of new markets. Krause, ¶ 11.

Further, the covered products solve the simulation speed problems present in competing products and prior art references. Krause, ¶¶ 13, 16. The solution to these problems is found in the features disclosed and claimed in the present application. Krause, ¶ 5. Given the competitiveness of the market and the improved structure and function of the covered products, it is believed that the covered products would be copied if competitors were assured that no patent protection was available for the covered products. Krause, ¶ 19.

Consequently, there is substantial evidence of non-obviousness in the commercial success of the covered products, the problems it solves, and the risk of copying by competitors. The objective evidence presented herewith should be considered by the Examiner, and it is respectfully maintained that that evidence warrants a conclusion of non-obviousness in and of itself. Given the deficiencies of the cited references as well, it is believed that the claims of the present application are clearly allowable.

For all of the above reasons, it is respectfully submitted that claims 40-42 are allowable under 35 U.S.C. §103.

## VIII. APPENDIX OF CLAIMS

(37 CFR § 41.37(c)(viii))

The text of the claims involved in the appeal are:

1. A computer-implemented system, comprising:

a first executing process that:

implements a first continuous-time model to simulate a first physical subsystem, the first model being programmed in a first language and having a first state variable; and

sends a first series of state-related numerical values, each numerical value reflecting information relating to the value of the first state variable at a different point  $t_m$  in simulation time in the first model; and

a second executing process that:

receives said first series of state-related numerical values from said first executing process without said first series of state-related numerical values passing through a central communication process;

implements a second continuous-time model to simulate a second physical subsystem, the second model being programmed in a second language and taking as an input values from said first series of state-related numerical values; and

outputs data representative of a state of the second continuous-time model.

2. The system of claim 1, wherein:

the second model has a second state variable;

said second process further sends a second series of state-related numerical values, each numerical value reflecting information relating to the value of the second state variable at a different point  $t_n$  in simulation time in the first model;

said first process further receives said second series of state-related numerical values; and

the first model takes as an input the value of the second state variable from said second series of state-related numerical values.

3. The system of claim 2, wherein for at least a first numerical value in said first series of state-related numerical values, said first numerical value reflecting information relating to the value of the first state variable at point  $t_l$  in simulation time in the first model, there is a second numerical value in said second series of state-related numerical values that reflects the value of the second state variable at point  $t_l$  in simulation time in the first model.

4. The system of claim 2, wherein for at least a first numerical value in a series of state-related numerical values, said first numerical value reflecting the value of the first state variable at point  $t_l$  in simulation time, there is no second numerical value in said second series of state-related numerical values that reflects the value of the second state variable at point  $t_l$  in simulation time.

5. The system of claim 1, wherein:

said first series of state-related numerical values comprises

a first numerical value reflecting information relating to the value of the first state variable at time  $t_l$  in simulation time in the first model;

a second numerical value reflecting information relating to the value of the first state variable at time  $t_2$  in simulation time in the first model; and

a third numerical value reflecting information relating to the value of the first state variable at time  $t_3$  in simulation time in the first model; and

wherein the first numerical value, second numerical value, and third numerical value are consecutive within said first series of state-related numerical values; and  $t_2 - t_1 = t_3 - t_2$ .

6. The system of claim 1, wherein:

said first series of state-related numerical values comprises

a first numerical value reflecting information relating to the value of the first state variable at time  $t_1$  in simulation time in the first model;

a second numerical value reflecting information relating to the value of the first state variable at time  $t_2$  in simulation time in the first model; and

a third numerical value reflecting information relating to the value of the first state variable at time  $t_3$  in simulation time in the first model; and

wherein the first numerical value, second numerical value, and third numerical value are consecutive within said first series of state-related messages; and  $t_2 - t_1 \neq t_3 - t_2$ .

7. The system of claim 1, wherein:

said first executing process exposes a first interface for the first model, where said first interface:

prevents access by said second executing process to a first substantial portion of the first model, and

allows access by said second executing process to a second substantial portion of the first model; and

said second executing process exposes a second interface for the second model, where said second interface:

prevents access by said first executing process to a first substantial portion of the second model, and

allows access by said first executing process to a second substantial portion of the second model.

8. The system of claim 1, wherein

the first model has a third state variable;

each numerical value in said first series of state-related numerical values further reflects information relating to the value of the third state variable at point  $t_m$  in simulation time; and

the second model also takes the third state variable as an input from said first series of state-related numerical values.

9. A computer-implemented method for simulating operation of a physical system having a plurality of physical subsystems, comprising:

simulating a first physical subsystem with a first continuous-time simulation on a first physical computing device;

accepting a request for export of information relating to a number  $n$  of state-related variables that characterize the state of the first physical subsystem in said simulating;

• .

sending a first series of state-related messages, each message containing information relating to the value of at least one of the  $n$  state-related variables;

simulating a second physical subsystem with a second continuous-time simulation on a second physical computing device;

receiving in said second continuous-time simulation said first series of state-related messages from said first continuous-time simulation without said first series of state-related messages passing through a central communication process; and

outputting data representative of a state of the second continuous-time simulation; wherein:  
the first physical subsystem interacts with the second physical subsystem; and  
the at least one state-related variable characterizes at least a portion of the interaction between the first physical subsystem and the second physical subsystem.

10. The method of claim 9, wherein:

said simulating a first physical subsystem is performed on a first processor, and  
said simulating a second physical subsystem is performed on the first processor.

11. The method of claim 9, wherein:

said simulating a first physical subsystem is performed on a first processor, and  
said simulating a second physical subsystem is performed on a second processor.

12. The method of claim 9, wherein the number  $n$  is at least two.

13. The method of claim 12, wherein the number  $n$  is at least four.



16. The method of claim 12, further comprising sending a third series of state-related numerical values, wherein:

at least one numerical value in the first series of state-related numerical values contains information relating to the values of a first proper subset of the set containing all  $n$  state-related variables;

at least one numerical value in the third series of state-related numerical values contains information relating to the values of a second proper subset of the set containing all  $n$  state variables, and

the second proper subset is different from the first proper subset.

17. The method of claim 16, wherein:

the messages in the first series of state-related numerical values are sampled at a first rate in simulation time in the first model;

the numerical values in the third series of state-related numerical values are sampled at a second rate in simulation time in the first model; and

the first rate and the second rate are not equal.

18. The method of claim 16, wherein:

the numerical values in the first series of state-related numerical values are sampled at a first rate in simulation time in the first model;

the numerical values in the third series of state-related numerical values are sampled at a second rate in simulation time in the first model; and

the first rate and the second rate are equal.

19. The method of claim 9, wherein:

a given process makes the request; and

said sending directs the first series of state-related numerical values to a process different from the given process.

20. The method of claim 9, further comprising:

receiving the first series of state-related numerical values in a first output process in communication with a first output device; and

sending to the first output device a first set of information carried by a plurality of numerical values in the first series of state-related numerical values; and

wherein the first output device is in communication with the first output process.

24. The method of claim 20, wherein said displaying comprises graphing a function of the first state-related variable versus an independent variable.

25. The method of claim 20, further comprising:

receiving a second series of state-related numerical values in the first output process; and

sending to the first output device a second set of information represented by a plurality of numerical values in the second series of state-related numerical values; and

wherein said sending steps comprise outputting time information associating the first set of information and the second set of information with a system time.

26. The method of claim 20, further comprising:

receiving a second series of state-related numerical values in a second output process, which is in communication with a second output device; and

outputting to the second output device a second set of information carried by a plurality of numerical values in the second series of state-related numerical values;

wherein said sending comprises associating the first set of information with a system time; and

said outputting comprises associating the second set of information with an independent variable.

29. The system of claim 1, wherein the first model is a state-space model.

31. The system of claim 1, wherein:

the implementation of the first continuous-time model uses a first numerical integration technique, and

the implementation of the second continuous-time model uses a second numerical integration technique.

32. The system of claim 1, wherein:

the first executing process and the second executing process are executed on a first processor.

33. The system of claim 1, wherein:

the first executing process is executed on a first processor, and

the second executing process is executed on a second processor.

34. The method of claim 16, wherein:

the second series of state-related numerical values is sent to a first destination; and  
the third series of state-related numerical values is sent to the first destination.

35. The method of claim 16, wherein:

the second series of state-related numerical values is sent to a first destination; and  
the third series of state-related numerical values is sent to a second destination.

36. The system of claim 24, wherein the independent variable is time.

37. The system of claim 24, wherein the independent variable is one of the  $n$  state-related variables.

38. The system of claim 24, wherein the independent variable is a state-related variable in the simulation of the second physical subsystem.

39. A computer-implemented system for simulating a physical system, the physical system comprising two or more subsystems, the computing system comprising a plurality  $n$  of computing devices, each simulating a subsystem of the physical system, wherein:

at least one subsystem is simulated by computationally solving a system of ordinary differential equations;

each subsystem simulation either

provides a series of output messages to another subsystem simulation, where

the output messages encode state-related data from the subsystem, or

receives a series of input messages from another subsystem simulation, where the input messages encode state-related data from the other subsystem simulation, or

both provides a series of output messages to another subsystem simulation, where the output messages encode state-related data from the subsystem, and receives a series of input messages from another subsystem simulation, where the input messages encode state-related data from the other subsystem simulation; and

the computing system provides an output signal from at least one of the subsystem simulations;

wherein the simulation of the physical system occurs with a speed greater than  $O(n)$  times the speed of the simulation using a single one of the computing devices.

40. In a computer-implemented distributed simulation of a physical system, the improvement comprising:

running a continuous-time simulation of the physical system in a set of  $n$  computing devices; and

outputting data representative of a state of the physical system simulation;

wherein the running occurs with a speed greater than  $O(n)$  times the speed of the simulation using a single one of the computing devices.

41. The system of claim 40, wherein the running occurs with a speed greater than  $O(n^2)$  times the speed of the simulation using a single one of the computing devices.

42. The system of claim 40, wherein the running occurs with a speed that is at least  $O(n^3)$  times the speed of the simulation using a single one of the computing devices.

43. The system of claim 39, wherein the running occurs with a speed greater than  $O(n^2)$  times the speed of the simulation using a single one of the computing devices.

44. The system of claim 39, wherein the running occurs with a speed that is at least  $O(n^3)$  times the speed of the simulation using a single one of the computing devices.

## **IX. APPENDIX OF EVIDENCE**

(37 CFR § 41.37(c)(ix))

Declaration of Paul C. Krause dated 1/17/06. Entered into the record on 1/17/06 when submitted by Applicants in support of their Amendment Under 37 C.F.R. §1.111.



380238:TJC:31122-8

From: 7654-1017

Page: 2/10

Date: 1/17/2006 3:44:17

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re U.S. patent application of: )  
 ) Before the Examiner  
Oleg Wasynczuk, et al. )  
 ) Ayal I. Sharon  
Serial No. 09/884,528 )  
 ) Group Art Unit 2123  
Filed June 19, 2001 )  
 )  
**DISTRIBUTED SIMULATION** )

**DECLARATION OF DR. PAUL C. KRAUSE**

1. My name is Dr. Paul C. Krause. I founded P.C. Krause and Associates, Inc. (hereinafter "PCKA") in 1983 and serve as President of the corporation. Since 1970, I have also held the position of Professor with the School of Electrical and Computer Engineering at Purdue University.

2. As president of PCKA, I oversee and have knowledge of all of the activities of the several employees of PCKA, including the sales and marketing of PCKA products and services.

3. PCKA has its headquarters in West Lafayette, Indiana and specializes in the analysis, design, and simulation of power systems and power system components, with particular emphasis on terrestrial power systems and power-electronic-based systems being used in or designed for ships, ground vehicles, aircraft, and spacecraft. In 2003, PCKA expanded its operations and opened a new office in Beavercreek, OH. Located just minutes from Wright-Patterson Air Force Base, this office supports numerous Air Force programs and research initiatives.

4. PCKA is the sole developer and provider of the Distributed Heterogenous Simulation (DHS) software under the present patent application.

5. The DHS software sold by PCKA includes the following features:



a first executing process that: a) implements a first continuous-time model to simulate a first subsystem, the first model being programmed in a first language and having a first state variable; and b) sends a first series of state-related numerical values, each numerical value reflecting information relating to the value of the first state variable at a different point  $t_m$  in simulation time in the first model; and

a second executing process that: a) receives said first series of state-related numerical values from said first executing process without said first series of state-related numerical values passing through a central communication process; b) implements a second continuous-time model to simulate a second subsystem, the second model being programmed in a second language and taking as an input values from said first series of state-related numerical values; and c) outputs data representative of a state of the second continuous-time model.

6. PCKA has received funding from numerous U.S. government agencies including the Air Force Research Lab (AFRL), United States Army, United States Marine Corps Systems Command, Missile Defense Agency (MDA), National Aeronautics and Space Administration (NASA), Naval Sea Systems Command (NAVSEA), Naval Surface Warfare Center (NSWC), Office of Naval Research (ONR), Tank-automotive and Armaments Command (TACOM), United States Naval Academy and United States Naval Postgraduate School, as well as several private companies.

7. To date, the PCKA DHS product has been purchased and/or adopted by many large and technologically sophisticated companies, including General Electric (Global Research, Aircraft Engines, Power Systems), Boeing Commercial Aircraft (for use on the 787 program), Northrup Grumman Corporation, Rolls Royce Corporation, Smiths Aerospace, and General Dynamics.

8. Typical purchase orders for the PCKA DHS product are \$20,000 to \$40,000, depending upon the selected options.

9. As an example, attached as Exhibit B is a purchase order from Boeing Shared Services Group for the PCKA DHS product in the amount of \$38,000.

10. As a further example, attached as Exhibit C are two purchase orders from GE Global Research for the PCKA DHS product in the aggregate amount of \$32,000.

11. As is well known, these are very large, extremely technically sophisticated companies that purchase research tools based upon their technical merit and not based upon advertising and marketing programs.

12. Such commercial success of the PCKA DHS product is evidence that the DHS product is not obvious in view of the prior art, as these companies could have simply used prior art techniques for simulation rather than purchase the DHS product from PCKA.

13. The PCKA DHS product was used by researchers at Northrup Grumman and the Air Force Research Laboratory to model and study the electrical-power system of the U.S. Air Force's high-altitude long-endurance (HALE) unmanned aerial vehicle (UAV). These researchers (in consultation with PCKA employees) authored a technical paper describing the simulation and the PCKA DHS product that was published in the November 2004 issue of *Aerospace Engineering*, published by the Society of Automotive Engineers/SAE Aerospace. The article describes the nearly 21-fold speed increase when using the DHS product simulation incorporating three computers as opposed to a single computer simulation. This article is attached hereto as Exhibit D.

14. The adoption and use of the PCKA DHS product by sophisticated users such as Northrup Grumman and the Air Force Research Laboratory, as well as the publication of a

description of the DHS simulation product (described as “new” and resulting in “significant improvements” in processing speed over prior techniques) in a prestigious technical journal such as *Aerospace Engineering*, is evidence of the non-obvious nature of the DHS product in view of the prior art.

15. The PCKA DHS product was also featured in the December 2005 issue of the Air Force Research Laboratory’s *Technology Horizons* magazine (attached hereto as Exhibit E). The article discusses the simulation speed increase allowed by the DHS product from 117,800 seconds of simulation time for each second of real time to only 120 seconds of simulation time for the same one second of real time using the DHS product on four inexpensive personal computers (a 981-fold speed increase).

16. Again, the adoption and use of the PCKA DHS product by a sophisticated user such as the Air Force Research Laboratory, as well as the publication of a description of the DHS simulation product (described as “substantially increases simulation speeds” and “markedly reduces engineering design costs” and “supports the integration of propulsion, power, thermal avionics, sensor and directed energy weapon subsystems at a level of detail not before possible” (emphasis added)) in the Air Force Research Laboratory’s own technical journal, is evidence of the non-obvious nature of the DHS product in view of the prior art.

17. Of particular significance, the U.S. Air Force has awarded PCKA a \$49 million IDIQ SBIR Phase III contract to support the commercialization of the DHS product. Furthermore, the Air Force has invested several million dollars in fundamental research that makes use of the DHS product to perform higher-level research objectives.

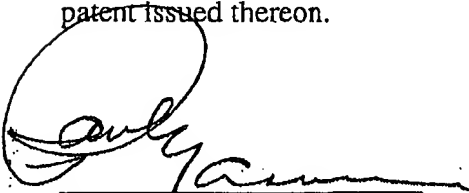
18. The U.S. Air Force’s enormous financial investment in the PCKA DHS product is further evidence of its non-obviousness in view of the prior art. This is particularly true in view

of the fact that the Air Force is an extremely sophisticated consumer and user of such simulation tools.

19. Based on my over twenty years of experience in the field of complex systems simulation and my knowledge of PCKA's competitors and their products, I believe that PCKA's competitors would copy the simulation methodologies described in the patent application if they knew that it was not protected by a patent or pending patent rights.

20. The covered simulation products have enjoyed exceptional commercial success, are believed to be at risk of copying by competitors, and solve problems inherent in all prior art simulation systems that were not able to be solved by the industry. This is evidenced by the large investment in and purchase of the DHS product by the world's most sophisticated users of system simulation software.

21. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



Dr. Paul C. Krause

1/17/06  
Date



# Exhibit B

Deliver this PO to:

MR. LUCAS



# Purchase Order

**Bill To:**

Software House International  
2 Riverview Drive  
Attn: Accounts Payable  
Somerset, NJ 08873

**Vendor:**

P.C. KRAUSE AND ASSOCIATES

MR. LUCAS

Phone: (765) 464-8997

Fax: (765) 464-1017

Email:

**Purchase Order Number:****YN9RL****Ship To:**

BOEING SHARED SERVICES GROUP  
8002 S. 212TH ST  
WA 7-482.1 DCK, DOOR 4

PO# 3418461

KENT

WA 98032

US

REQ. SHIP DATE	BUYER	SHIP VIA	CURRENCY	TERMS
06/22/2005	Amanda Hoffman	UPS GROUND	US DOLLAR	NET 30

QTY	MFG PART#	DESCRIPTION	UNIT PRICE	TOTAL
1	NONE	DISTRIBUTED HETEROGENEOUS SIMULATION S/W/FULL PACKAGE/SHRINKW Version: 0.0   WINDOWS 98/2000/NT/ME/XP   CDROM MFR: PC KRAUSE AND ASSOCIATES   Language: ENGLISH, US End User Name: LINDA DANIELS End User Phone: 4252663725 End User Email: LINDA.S.DANIELS@BOEING.COM	10,000.00	10,000.00
1	NONE	DISTRIBUTED HETEROGENEOUS SIMULATION S/W/FULL PACKAGE/SHRINKW Version: 0.0   WINDOWS 98/2000/NT/ME/XP   CDROM MFR: PC KRAUSE AND ASSOCIATES   Language: ENGLISH, US End User Name: LINDA DANIELS End User Phone: 4252663725 End User Email: LINDA.S.DANIELS@BOEING.COM	10,000.00	10,000.00
1	NONE	DISTRIBUTED HETEROGENEOUS SIMULATION S/W/FULL PACKAGE/SHRINKW Version: 0.0   WINDOWS 98/2000/NT/ME/XP   CDROM MFR: PC KRAUSE AND ASSOCIATES   Language: ENGLISH, US End User Name: LINDA DANIELS End User Phone: 4252663725 End User Email: LINDA.S.DANIELS@BOEING.COM	18,000.00	18,000.00

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2. Do not include any pricing information in package.
3. Notify us immediately if you are unable to ship as specified.
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Your confirmation #

PCKA/SHI-002

Expected ship date

June 30, 2005

Approx. Shipping Cost

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PO # YN9RL

Subtotal: 38,000.00

Freight: See Instructions

Tax: See Instructions

**Total: 38,000.00**

Authorized by: Amanda Hoffman

Phone: (732) 868-8988 Fax: 732-302-9730

Email: amanda\_hoffman@shi.com

Thank You!!

Check deposited 8/18/05

INVOICE#	INV. DATE	PAY AMOUNT	DISC	TAKEN	DATE	CHECK NO.	VENDOR KEY
2PCKASHI	06/23/05	38000.00		0.00	08/08/05	230848	49223
						VOUCHER NO.	NET AMOUNT
						VOUCHER 296497	38000.00
TOTALS		38000.00		0.00			38000.00

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62-227-311

23084

DATE 08/08/05 CHECK NO. 230848 AMOUNT \*\*\*\*\*\$38,000.00

THIRTY-EIGHT THOUSAND AND NO/100 Dollars

PAY  
TO THE  
ORDER OF

P C KRAUSE AND ASSOCIATES  
1220 POTTER DR  
HENTSCHEL CENTER, SUITE 130D  
WEST LAFAYETTE, IN 47906 USA

VOID AFTER 120 DAYS

⑈230848⑈ ⑆031100225⑆2079950043816⑈



# Exhibit C



# Purchase Order:

**GE Global Research**

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PC KRAUSE & ASSOCIATES INC  
HENTSCHEL CENTER  
1220 POTTER DRIVE  
WEST LAFAYETTE, IN 47906  
United States

Phone: (765) 464-8997 Fax: (765) 464-1017

PURCHASE ORDER NO.	REVISION	PAGE
A02 700106506	0	1

THIS PURCHASE ORDER NO. MUST APPEAR ON ALL INVOICES, PACKING  
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One Research Circle  
Receiving Building  
Niskayuna, NY 12309  
United States

BILL TO:

GE Global Research  
Accounts Payable  
PO Box 9531  
Ft. Myers FL 33906-9531  
United States

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CUSTOMER ACCOUNT NO.	VENDOR NO. 928109	DATE OF ORDER / BUYER NAME 06-DEC-04 PRATICO, S	REVISED DATE / BUYER PHONE NUMBER 1 518 387-5590
SHIPMENT TERMS 01 60	SHIP VIA FedEx 2Day #012200714	FOB. Destination	
WEIGHT TERMS Collect	REQUESTOR / DELIVER TO KERN, JOHN M	VENDOR CONTACT / TELEPHONE Lucas, E (765) 464-8997	

ITEM	PART NUMBER / DESCRIPTION	DELIVERY DATE	QUANTITY	UNIT	UNIT PRICE	EXTENSION	TAX
Any questions regarding this purchase order should be directed to the Buyer and phone number listed above. ***** INTEGRITY STATEMENT. If you as a Supplier become aware of any situation that appears to be inconsistent with GE's Policy to maintain lawful and fair practices in its' supplier relationships, you may write to our local GE Ombudsman as follows: GE Ombudsman, GE Global Research, One Research Circle, Niskayuna, NY 12309. ***** as per quotes 112904-1 & 120604-1 ***ALL ITEMS ON THIS PO MUST BE RECEIVED BY GE GLOBAL RESEARCH ON OR BEFORE 12/30/04***							
1	Distributed Heterogeneous Simulation software for C running on Windows OS	30-DEC-04	2.00	Each	2000	4,000.00	N
	DELIVER TO: KERN, JOHN M (1.00) EP-111-I	30-DEC-04	2.00	Each			N
	DELIVER TO: KERN, JOHN M (1.00) EP-111-I						
2	Distributed Heterogeneous Simulation software for Simulink running on	30-DEC-04	2.00	Each	10000	20,000.00	N

Total Continued

AUTHORIZED SIGNATURE  
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ANY OTHER STATE SALES AND USE TAX CERTIFICATE NO. 14-0333240C IF APPLICABLE  
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12/12/04



# Purchase Order:

**GE Global Research**

SELLER:

PC KRAUSE & ASSOCIATES INC  
HENTSCHER CENTER  
1220 POTTER DRIVE  
WEST LAFAYETTE, IN 47906  
United States

Phone: (765) 464-8997 Fax: (765) 464-1017

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A02 700106506	0	2

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United States

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Ft. Myers FL 33906-9531  
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	928109	06-DEC-04 PRATICO, S	1 518 387-5590
PAYMENT TERMS	SHIP VIA	F.O.B.	
01 60	FedEx 2Day #012200714	Destination	
WEIGHT TERMS	REQUESTOR / DELIVER TO	VENDOR CONTACT / TELEPHONE	
Collect	KERN, JOHN M	Lucas, E (765) 464-8997	

ITEM	PART NUMBER / DESCRIPTION	DELIVERY DATE	QUANTITY	UNIT	UNIT PRICE	EXTENSION	TAX
	Windows OS	30-DEC-04	2.00	Each			N
	DELIVER TO: KERN, JOHN M (1.00) EP-111-I						
	DELIVER TO: KERN, JOHN M (1.00) EP-111-I						
3	Distributed Heterogenous Simulation software for Fortran running on Windows OS	30-DEC-04	2.00	Each	2000	4,000.00	N
	DELIVER TO: KERN, JOHN M (1.00) EP-111-I	30-DEC-04	2.00	Each			N
	DELIVER TO: KERN, JOHN M (1.00) EP-111-I						

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NY STATE SALES AND USE TAX CERTIFICATE NO. 14-05893402 IF APPLICABLE  
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20012-1

**Total** 28,000.00

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**GE Global Research**

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# Purchase Order

GE Global Research

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PC KRAUSE & ASSOCIATES INC  
HENTSCHEL CENTER  
1220 POTTER DRIVE  
WEST LAFAYETTE, IN 47906  
United States

Phone: (765) 464-8997

Fax: (518) 387-5716

PURCHASE ORDER NO.	REVISION	PAGE
A02 700107716	1	1

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United States

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PO Box 9531  
Ft. Myers FL 33906-9531  
United States

FOR PROMPT PAYMENT YOUR INVOICE MUST MIRROR THIS PURCHASE ORDER

CUSTOMER ACCOUNT NO.	VENDOR NO.	DATE OF ORDER / BUYER NAME	REVISED DATE / BUYER PHONE NUMBER
	928109	12-JAN-05 APPIO, J	25-JAN-05 518-387-6489
PAYMENT TERMS	SHIP VIA	F.O.B.	
01 60	FedEx 2Day #012200714	Destination	
FREIGHT TERMS:	REQUESTOR / DELIVER TO	VENDOR CONTACT / TELEPHONE	
Collect	KERN, JOHN M	Lucas, E (765) 464-8997	

ITEM	PART NUMBER / DESCRIPTION	DELIVERY DATE	QUANTITY	UNIT	UNIT PRICE	EXTENSION	TAX
Any questions regarding this Purchase Order should be directed to the Buyer and phone number listed above.							
*****							
INTEGRITY STATEMENT. If you as a Supplier become aware of any situation that appears to be inconsistent with GE's Policy to maintain lawful and fair practices in its' supplier relationships, you may write to our local GE Ombudsman as follows: GE Ombudsman, GE Global Research, One Research Circle, Niskayuna, NY 12309.							
*****							
Attn: Eric- Quote 112904-2. Be sure to reference the PO on all items shipped. Questions, 518-387-6489							
1	Distributed Heterogeneous Simulation software for Saber running on Windows Operating System	12-MAR-05	2.00	Each	2000	4,000.00	N
		12-MAR-05	2.00	Each			N
DELIVER TO: KERN, JOHN M (2.00) EP-111-I							

ACCEPTANCE OF THIS ORDER CONSTITUTES YOUR CERTIFICATION THAT ALL MATERIAL IS IN CONFORMANCE WITH ALL OSHA REQUIREMENTS.  
DO NOT INSURE UNLESS SPECIFIED.  
SUBSTANTIATE PREPAID CHARGES INVOICED.  
MATERIAL DELIVERY HOURS ARE 7:00 A.M. - 3:30 P.M., MON. - FR. UNLESS OTHERWISE AUTHORIZED BY THE UNDERSIGNED.  
NEW YORK STATE SALES AND USE TAX CERTIFICATE NO. 14-0680340C, IF APPLICABLE.  
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RD4014-1

Total 4,000.00

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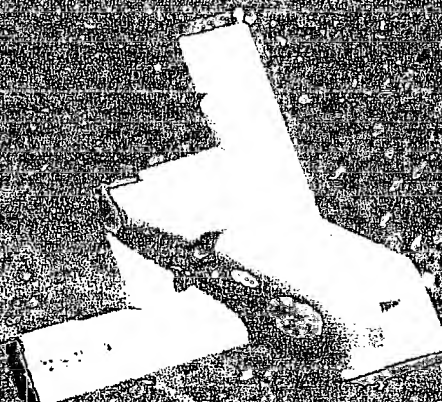
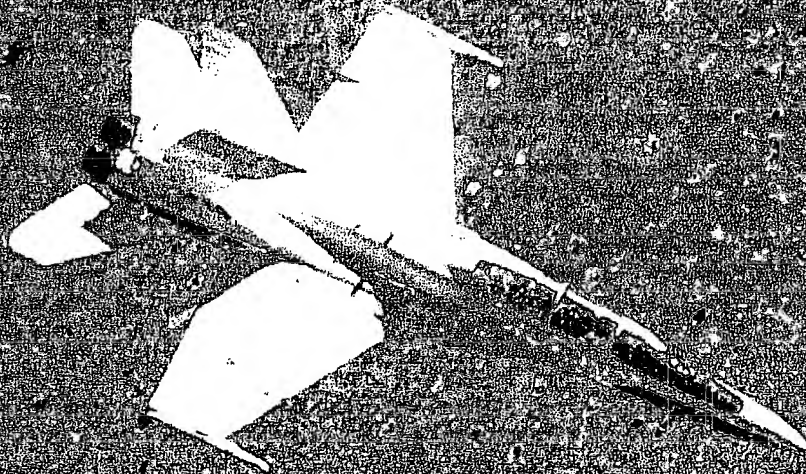
# Exhibit D



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SAE 100

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# Distributed simulation

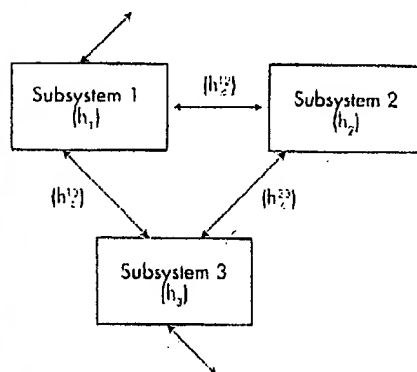
*A new modeling technique is applied to a HALE UAV power system using detailed subsystem simulations of the turbine engine, generators, and loads.*

**A**ircraft power systems have historically been divided into separate mechanical and electrical subsystem simulations. In the mechanical subsystem simulation, the turbine engine has mainly been modeled with a small steady-state load representing the electrical subsystem interaction. Similarly, the electrical subsystem was modeled assuming the turbine engine was an infinite mechanical source. This decoupling of the power system provided sufficient accuracy since the electrical subsystem used only a few percent of the available mechanical power.

However, with the size of aircraft electrical subsystems continuing to grow as a result of electric actuation and high-power pulsing loads, the interactions between the turbine engine and electrical subsystems can no longer be neglected

under certain flight envelopes. Specifically, the electrical-power system capacity for high-altitude long-endurance (HALE) UAVs is limited under high-altitude flight due to the decreased output power of the turbine engine when compared to sea-level conditions.

A HALE vehicle engine is generally more sensitive to power extraction from the generators required to support high-power loads that must operate during the high-altitude loiter mission phase. According to researchers from Northrop Grumman, PC Krause and Associates, and the Air Force Research Laboratory (AFRL), during the design of such systems it is crucial to develop an integrated turbine/electrical system simulation to investigate potential adverse dynamic interactions and to ensure system stability and power quality while optimizing overall vehicle performance, weight, and cost.



*Figure 1. Distributed heterogeneous simulation (DHS) is a recently developed simulation paradigm in which the overall system model is viewed as a collection of synchronized interconnected subsystems, eliminating the need to form a complete system model within a single simulation software package.*

## The background

A new distributed simulation paradigm called distributed heterogeneous simulation (DHS) has been developed in which the overall system model is viewed as a collection of synchronized interconnected subsystems (Figure 1). This interconnection of subsystem models eliminates the need to form a complete system model within a single simulation software package, allowing each subsystem to be modeled using a simulation language targeted for the design and analysis of that given subsystem.

A virtually unlimited number of subsystems can be included into a simulation and be readily distributed across any number of networked computers. Each subsystem is integrated using an

independently selected algorithm and time-step control mechanism.

The interactions between subsystems are represented through the exchange of interface variables at rates that may be independently selected. The subsystems can be electrical, mechanical, hydraulic, thermal, or any combination thereof. This approach enables true parallel-rates integration wherein all subsystem integration time-steps and interface exchange rates may be independently selected.

With this parallel-rates integration, significant improvements in computational performance are possible. In fact, using an M-computer network, DHS has been shown to result in a significantly larger than M-fold gain in computational speed. For example, DHS was shown to provide a 1500% increase in simulation speed for a naval integrated power system when distributed across only three personal computers with essentially identical accuracy to the single-computer implementation.

Furthermore, as the size of the system grows, the additional subsystem models can be executed on separate computers without slowing down the overall simulation. Therefore, this approach is scalable and a valid alternative for the design and analysis of large-scale systems.

### The model

A representative HALE UAV power system was used as the study system for this distributed simulation research. The study system was separated into three parts, which included both the engine and the high-pressure (HP) and low-pressure (LP) spool subsystems, based upon convenient component boundaries (Figure 2). The engine subsystem was modeled using a generic two-spool engine simulation developed by the AFRL within The MathWorks' MATLAB/Simulink.

The AFRL model represents a large-displacement, time-varying model based upon the engine dimensions, component maps, and shaft inertias. The engine model has several flight parameters that are adjustable over a preset range. These parameters include flight altitude, air speed, and power-level angle. A generic FADEC (full-authority digital electronic control) was implemented within the engine model to provide closed-loop control. Both HP- and LP-spool gearboxes, as well as a mechanical load for

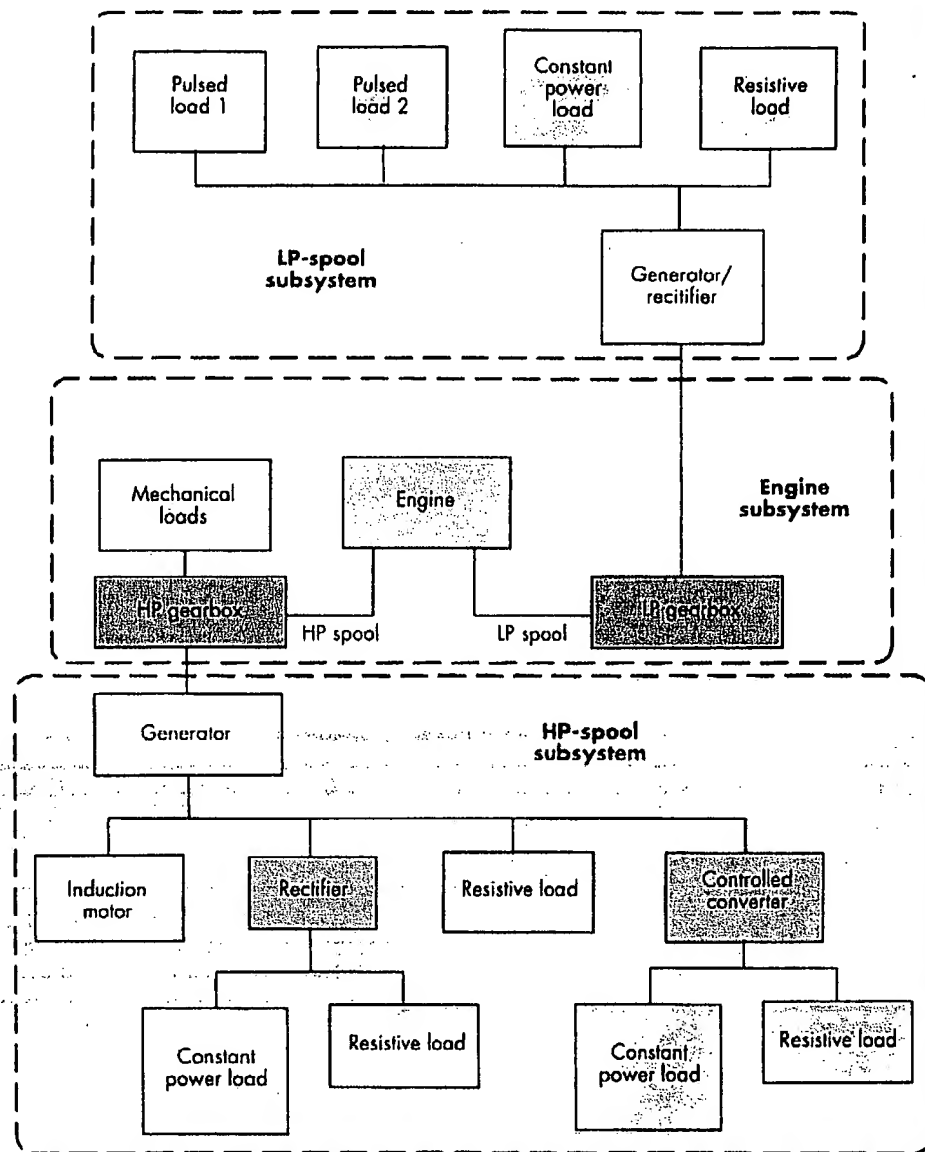


Figure 2. DHS was used to form a dynamic system-level simulation of a high-altitude, long-endurance power system for a UAV, which included detailed dynamic models of a turbine engine, high-pressure (HP) and low-pressure (LP) spool generators, and payloads.

the HP gearbox, were incorporated into the engine subsystem model.

The HP-spool subsystem consisted of an ac generator with three loads. The loads were representative of a pump (induction motor), a sensor with an input power-electronic converter (constant-power load), and house-keeping power (resistive load). Parameters were added to the model to allow each load to be turned on or off and to allow changes to be made in the power settings for the constant-power and resistive loads.

The LP-spool subsystem contained a generator/rectifier supplying pulsed and resistive dc loads. The switch-level model of the generator rectifier was modeled

within MATLAB/Simulink using the automated state model generator. The model enabled the pulsed and resistive loads to be turned on or off and adjustment to be made in the power levels.

### The simulation

The study began with one computer being used to model the HALE UAV power system shown in Figure 2. Data from this part of the study would be used as the benchmark for simulation accuracy and computational performance in the investigation of the distributed simulation.

For this system, the component models were developed by several engineers



Table 1: Simulation Study Load Profile

Load identifier	Normalized value
LP resistive load	0.0
HP gearbox mechanical load	0.0
HP induction motor	0.0
LP pulsed load 1	1.0
LP pulsed load 2	1.3
LP constant-power load	1.5
HP resistive load	1.7
HP converter constant-power load	1.8
HP rectifier constant-power load	2.0
HP converter resistive load	2.2
HP rectifier resistive load	2.3

with expertise in modeling their respective components. Therefore, different integration algorithms, time-steps, and error tolerances were used for each component model to optimize the computational performance while maintaining simulation accuracy. Since the dynamics associated with the engine model are predominantly thermodynamic and mechanical processes, the time-step size required for the engine model is typically much larger than those associated with the switch-level electrical models.

However, when incorporated into a single-system model, the system integrator must determine the optimal integration algorithm and time-step control mechanism for the overall system simulation. These parameters are typically governed by the smallest maximum time-step and error tolerances used in any of the component models. This restriction further reduces the computational speed for large-scale system simulations.

For this study system, it was determined that due to the stiffness of the detailed high-speed LP-spool generator/rectifier model, the optimal integration algorithm for the system simulation was the variable-step ode23tb algorithm with a maximum time-step size being 10  $\mu$ s and a relative tolerance of  $10^{-3}$ . The minimum step size was chosen by time-step control mechanism. With these parameters, a simulation study of 2.5 s duration was performed with the load profile (Table 1). The results from this study were assessed and determined to be quite reasonable. The time required to execute this 2.5-s simulation study was 406.2 min on a 1.8-GHz Pentium-based PC.

### The distribution

Although the single computer implementation was functional for the evaluation of electrical transients that subside in the sub-second range, using this simulation to study the thermal transients within the turbine engine could result in execution times that may be on the order of days, if not weeks.

Therefore, the system simulation was divided into three models representing the turbine engine as well as the HP- and LP-spool electrical subsystems. This step was used to exploit the possible increases in simulation speed offered by distributed computing. To accomplish this subdivision, the original models were modified slightly to provide an interface for the exchange of data between the subsystem models. This modification was accomplished using the DHS toolbox for MATLAB/Simulink. Shaft speeds are calculated by the engine model, and the electromagnetic torques that load the shafts are calculated within the electrical subsystems (Figure 3).

With the system distributed into three subsystem simulations, the communication interval at which the data needs to be exchanged for each interface had to be selected. Selection of the communication interval is similar to selecting the time-step size for a fixed time-step integration algorithm. The optimal choice is one in which the communication interval is maximized while maintaining a certain fidelity in the exchanged variables and accuracy in the overall system simulation.

In this regard, two distributed simulation studies were performed. In the first study, the communication interval was

selected to maximize the fidelity of the exchanged variables, emulating the condition in which all subsystem models are contained within a single simulation on one computer. This choice limits the potential increases in simulation speed possible using DHS.

To achieve high fidelity with the exchanged variables, the communication intervals for both interfaces were set to the smallest of the maximum or fixed time-step size required by either of the communicating subsystem models. Potentially, this action could result in the model exchanging data at every time-step, assuming that the models run at the maximum step size, or at a fixed step size.

For the system under study, the limiting time-step sizes for both of the interfaces were set by the electrical subsystems. Therefore, for the first distributed simulation study, the communication interval for the LP-spool and engine interconnection was set to 10  $\mu$ s and the communication interval for the HP-spool and engine interconnection was set to 0.3 ms.

Since each subsystem model can use a different integration algorithm, the algorithms originally selected by the component model developers were selected for each subsystem. Therefore, the LP-spool and engine subsystem models both used the variable-step ode23tb algorithm, whereas the HP-spool used the variable-step ode15s algorithm.

The relative tolerance for each simulation was set to  $10^{-3}$ . The subsystem models were distributed across three 1.8-GHz Pentium-based PCs that were networked via a 100-Mbps Ethernet hub. The distributed models were interconnected via DHS, and the 2.5-s study previously described for the single-computer implementation was repeated. For this high-fidelity distributed-simulation implementation, the 2.5-s study required 58.4 min. For this study, both the transient and steady-state results were compared to those predicted by the single-computer implementation and no distinguishable differences were observed. Therefore, by using this high-fidelity distribution, the simulation produced nearly identical results with nearly a seven-fold increase in simulation speed when compared to the single-computer system simulation.

For the second distributed simulation, the goal was to determine what

degree of interface variable fidelity was actually necessary for proper simulation operation, and to select the communication interval accordingly. This potential increase in the size of the communication interval can maximize the subsystem-simulation computational performance while also eliminating unnecessary communication latencies.

From observation of the previous studies, it was determined that the high-frequency electromagnetic torque from the LP-spool generator is filtered by the turbine shaft inertia, and only the average torque appears to impact the engine dynamics. This feature would not be the case if sheer stresses were included in the engine model and fault conditions were of interest. However, for the given investigation, the high-frequency torques are not required.

In addition, the mechanical speed of the LP-spool shaft varies slowly in comparison to the electrical system variables. Therefore, sampling of the LP-shaft speeds at a rate commensurate to the electrical subsystem dynamics is unnecessary. As a result, the communication intervals for both interfaces were set to 0.3 ms in the second distributed simulation study. To capture the overall electromagnetic torque dynamics and to eliminate the possibility of sampling a high-frequency peak (spike), the average of the electromagnetic torque over the previous communication interval was exchanged instead of the instantaneous value.

Besides the change in the communication interval between the LP-spool and engine subsystems, the maximum time-step for the engine subsystem simulation was increased to 0.3 ms to match the communication interval. With all other conditions identical to the first distributed simulation study, the 2.5-s study was repeated (Table 1).

The transient and steady-state responses for this study were compared to the results produced by the single-computer simulation, and no distinguishable differences were observed. However, in contrast to the more than 6 h required to perform the single-computer study, the second distributed simulation study required only 19.4 min, corresponding to nearly a 21-fold increase in simulation speed compared to the single-computer implementation and a three-fold increase compared to the previous distributed simulation. This increase is significant,

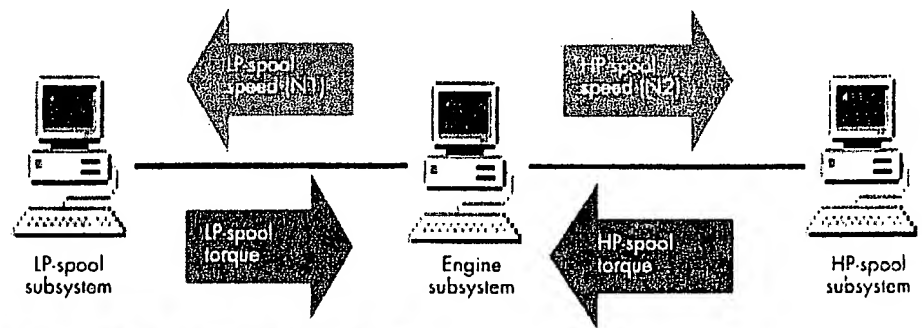


Figure 3 For the FAIR UAV power system, nearly 21-fold increase in simulation speed was achieved by distributing the system simulation across three computers while producing results virtually identical to a single-computer implementation.

Table 2: Simulation Speed Comparison

Simulation approach	Time required for study, min	Simulation speed increase compared to single computer
Single computer	406.2	N/A
Distributed with high-fidelity interface variables	58.4	6.96
Distributed with averaged interface variables	19.4	20.9

and would be even more so if the intent of the study was to investigate an engine thermal cycle over an entire flight. With DHS, such an investigation is now possible. A summary of the simulation times required for each of the studies is provided in Table 2.

From this investigation of distributed simulation, it is apparent that distributed simulation benefits from not only parallel processing, but the ability to optimize each subsystem simulation based upon its own integration algorithm and time-step. This flexibility is not offered when a single-system model is formed wherein the integration algorithm and parameters may be governed by the dynamics associated with only a single component. In addition, the selection of the communication interval based upon the dynamics of the entire subsystem may be too conservative.

Although such a selection requires only limited knowledge into the subsystem coupling, the interface variables may be over-sampled, thereby limiting the maximum time-step and resulting in unnecessary communication latencies. Such over-sampling only leads to decreased computational performance. Therefore, instead of basing the communication-interval selection upon a dynamic that may only be associated with

an internal subsystem state variable, a better selection is to base the communication-interval size on the dynamics of the interfaced variables.

Such a selection requires further investigation by the system integrator as to the optimal choice that preserves the interfaced dynamics. For this system, the filtering offered by the interfaced mechanical shaft dynamics made communicating high-frequency electrical transients unnecessary. Therefore, a further increase in simulation speed was available while not sacrificing the overall system accuracy.

Information for this article was provided by Scott Graham, Ivan Wong, Won-Zon Chen, Alex Lazarevic, and Keith Cleek, Northrop Grumman; Eric Walters, Charles Lucas, and Oleg Wasynczuk, PC Krause and Associates; and Peter Lamm, Air Force Research Laboratory.

# Exhibit E



TECHNOLOGY

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- 12 Partnership Intermediary Agreement
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- 18 Distributed Heterogeneous Simulation Laboratory
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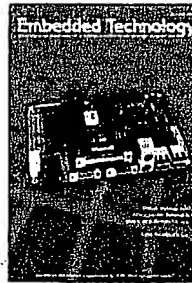
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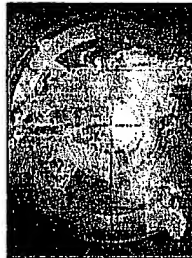
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## ON THE COVER



### ON THE COVER

The new state of the world demands a capacity for proactive response to ever-changing global conditions. AFRL remains fully committed both to providing the advanced space, cyberspace, air, and ground technologies required to support America's national security interests around the world and to ensuring that US Air Force (AF) assets remain at the cutting edge of performance, flexibility, and affordability. Achieving this goal goes beyond in-house collaboration; AFRL must continue to forge strong relationships with academic institutions and

industrial entities, large and small. The stronger AFRL's relationships are with academia and industry, the better its outcomes will be in leading the discovery, development, and delivery of revolutionary technologies for the AF. Article begins on page 6.

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# Distributed Heterogeneous Simulation Laboratory

*The Distributed Heterogeneous Simulation Laboratory enables faster, more detailed simulations of large-scale dynamic systems.*

**A**FRL's Distributed Heterogeneous Simulation (DHS) Laboratory (see figure) provides the inexpensive, high-speed computational capability needed to enhance the design, operation, and security of large-scale dynamic systems. The facility employs advanced DHS techniques developed by PC Krause and Associates, Inc., under Air Force (AF) Small Business Innovation Research Phase I and II contracts.

Building complex, large-scale systems such as commercial or military aircraft, unmanned air vehicles, ships, land vehicles, and advanced weapons systems involves a broad spectrum of diverse technologies and interactive subsystems that must work synergistically in order to achieve mission goals. The design of such systems involves collaboration among numerous geographically dispersed design teams and similar groups associated with private companies, government laboratories, and universities focused individually upon specific subsystems or areas of expertise. Due to subsystem interdependencies that together comprise the overall system, it has become increasingly important to form a detailed, end-to-end system simulation encompassing the design, analysis, and optimization of such systems.

Prior to the availability of DHS

techniques, engineers performed large-scale, multidisciplinary system simulations using simplified, reduced-order component models—a limitation due to prohibitively long computation times associated with more detailed models. Further, they had to develop all subsystem models using a single simulation language. As a result, component manufacturers often needed to develop two models: one using their in-house simulation language tailored toward detailed design and analysis, and a second using the specified language necessary for system integration. This requirement involved significant effort and essentially doubled modeling and simulation costs.

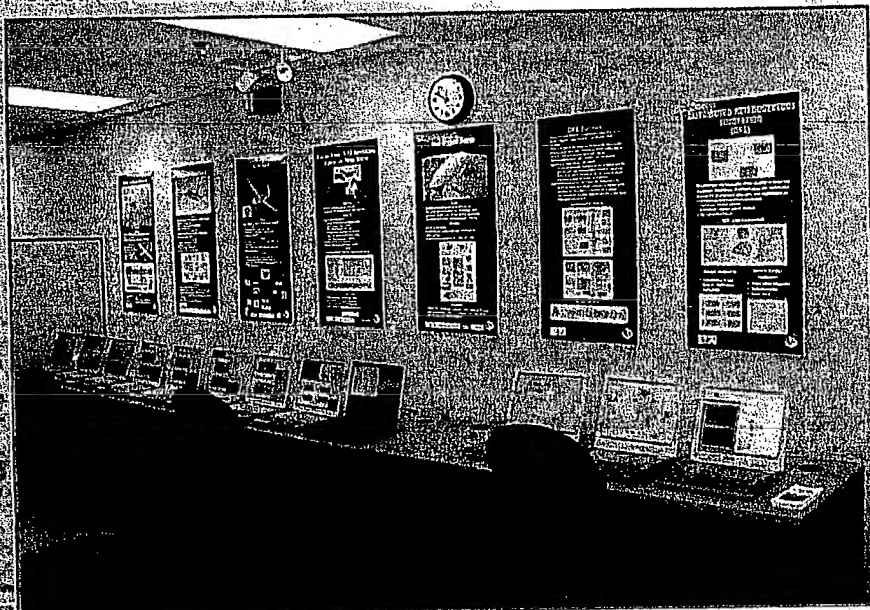
DHS substantially increases simulation speeds. In 1996, it took 117,800 seconds to compute 1 second of real time for a specific power, electronic-based system, whereas it now requires only 120 seconds to perform the same computation using a four-computer network of inexpensive personal computers. This speed increase, coupled with the ability to integrate subsystem models developed using different simulation languages and implemented under different operating systems, enables the formation of large-scale, multidisciplinary system simulations utilizing detailed models. This capability markedly reduces engi-

neering design costs by providing a unique and inexpensive tool to conduct research, design, and evaluation of various system architectures and components for large-scale, tightly coupled, integrated "systems of systems." The DHS Laboratory offers the following features and benefits:

- Subsystem simulation using ACSL, C++, EASY5, Fortran, Saber, Simulink, and others
- Variety of supported operating systems: Windows® NT, 98, 2000, and XP, along with UNIX Solaris® 8
- No need to convert models into a common language
- No need to translate legacy code/models
- Proprietary/classified data and design protection
- Interconnections over local or wide area networks

Engineers are using the DHS Laboratory to simulate and analyze numerous systems of AF interest. Their research supports the integration of propulsion, power, thermal, avionics, sensor, and directed energy weapon subsystems at a level of detail not before possible. Work supporting the Global Hawk program is presently under way to investigate the integrated performance of propulsion, power, and electrical load dynamics, including advanced sensor suites such as the Multipurpose Radar Technology Insertion Program for expanded available payload during high-altitude flight. In addition, engineers are using the DHS facility to support the F-35 Joint Strike Fighter program by integrating and safeguarding proprietary contractor models written in different languages to investigate and mitigate adverse component interactions. The DHS Laboratory is also currently supporting the F-16 Integrated Cooling and Power System, Airborne Active Denial, and High-Altitude Airship programs.

Mr. Tom Brown (Universal Technology Corporation), of the Air Force Research Laboratory's Propulsion Directorate, wrote this article. For more information, contact TECH CONNECT at (800) 203-6451 or place a request at <http://www.afrl.af.mil/techconn/index.htm>. Reference document PR-H-05-01.



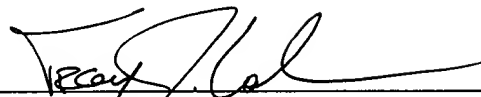
DHS Laboratory

**X. APPENDIX OF RELATED DECISIONS**

(37 CFR § 41.37(c)(x))

None.

Respectfully Submitted:

A handwritten signature in black ink, appearing to read "Troy J. Cole", is written over a horizontal line.

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mination differ from those required by the countervailing duty order, whereas interest is prohibited when the deposits made after a preliminary determination differ from those required by the countervailing duty order. See S.Rep. No. 96-249, at 59 (1979), reprinted in 1979 U.S.C.C.A.N. 381, 445. The Court of International Trade's interpretation that interest is required only where there is a "difference between the preliminary amount and the final amount" is contrary not only to the plain language of the statute and legislative history, but also to the international agreement, compliance with which the statute effected. See *id.* at 60, reprinted in 1979 U.S.C.C.A.N. at 446 ("Article 5(6) of the [General Agreement on Tariffs and Trade] prohibits collection of the difference between any security posted during the investigation and the final countervailing duty if the latter exceeds the former. Section 707(a) [now, § 1671f(a)] implements this provision."). Because NZL's deposits under section 1671e(a)(3) were less than the duty imposed by the section 1671e order, NZL must pay interest.

[2] NZL argues that it never made deposits "under section 1671e(a)(3)" as a result of Customs' error, but does not identify the type of deposits it made instead. This argument is meritless. Because Commerce had issued a final determination when NZL deposited 0.36 NZ cents per pound on its entries, these deposits were "under section 1671e(a)(3)." NZL also argues generally that "principles of equity" should allow it to escape its obligation under section 1671f(b) because Customs failed to collect the estimated duty specified in the order. To the extent this argument raises the specter of equitable estoppel, it must fail because equitable estoppel "is not available against the Government in cases involving the collection or refund of duties on imports." *United States v. Federal Ins. Co.*, 805 F.2d 1012, 1016 (Fed.Cir.1986) (quoting *Air-Sea Brokers, Inc. v. United States*, 66 C.C.P.A. 64, 596 F.2d 1008, 1011 (CCPA 1979)).

Before the Court of International Trade, the parties disputed the factual issue of whether NZL tendered the proper amount to Customs at the time the goods entered. This dispute need not detain us, however, because the statute's only concern is whether the

actual deposits were less than those required by the countervailing duty order. The parties agree that they were. Therefore, no genuine issue of material fact precludes summary judgment for the United States.

#### Conclusion

Accordingly, the judgment of the Court of International Trade is reversed.

REVERSED.



STATE STREET BANK & TRUST  
CO., Plaintiff-Appellee,

v.

SIGNATURE FINANCIAL GROUP,  
INC. Defendant-Appellant.

No. 96-1327.

United States Court of Appeals,  
Federal Circuit.

July 23, 1998.

Bank brought action against assignee of patent for computerized accounting system used to manage mutual fund investment structure, seeking declaratory judgment that patent was invalid and unenforceable. The United States District Court for the District of Massachusetts, Patti B. Saris, J., 927 F.Supp. 502, granted summary judgment for bank, and assignee appealed. The Court of Appeals, Rich, Circuit Judge, held that: (1) patent was directed to machine, not process; (2) invention was not unpatentable under mathematical algorithm exception to patentability; and (3) there is no "business method" exception to patentability.

Reversed and remanded.

#### 1. Federal Courts ⇐766

On appeal, Court of Appeals is not bound to give deference to the district court's

STATE STREET BANK & TRUST CO. v. SIGNATURE FINANCIAL 1369

Cite as 149 F.3d 1368 (Fed. Cir. 1998)

grant of summary judgment, but must make an independent determination that the standards for summary judgment have been met.

2. Patents ⇐324.5

Court of Appeals reviews patent claim construction de novo including any allegedly fact-based questions relating to claim construction.

3. Patents ⇐324.5

Court of Appeals reviews statutory construction de novo.

4. Patents ⇐101(8)

"Machine" claims having means-plus-function clauses may only be reasonably viewed as process claims if there is no supporting structure in the written description that corresponds to the claimed "means" elements.

5. Patents ⇐101(11)

Patent claiming data processing system for managing a financial services configuration of a portfolio established as a partnership, which machine was made up of, at the very least, specific structures disclosed in written description and corresponding to means-plus-function elements recited in claim, was directed to machine, not process. 35 U.S.C.A. § 101.

6. Patents ⇐3

It is improper to read limitations into statute generally setting forth patentable subject matter where the legislative history indicates that Congress clearly did not intend such limitations. 35 U.S.C.A. § 101.

7. Patents ⇐6

Unpatentable mathematical algorithms are identifiable by showing they are merely abstract ideas constituting disembodied concepts or truths that are not "useful"; to be patentable an algorithm must be applied in a "useful" way. 35 U.S.C.A. § 101.

8. Patents ⇐6

Transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, for purpose of managing mutual fund investment structure, was practical application of a mathematical algorithm, formula, or calculation, because it produced useful, concrete and tangible result, and claimed machine thus was not unpatent-

able under mathematical algorithm exception to patentability. 35 U.S.C.A. § 101.

9. Patents ⇐6

Dispositive inquiry in determining patentability of invention notwithstanding its inclusion of mathematical algorithm is whether the claim as a whole is directed to statutory subject matter; it is irrelevant that a claim may contain, as part of the whole, subject matter which would not be patentable by itself, and claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program or digital computer. 35 U.S.C.A. § 101.

10. Patents ⇐101(1)

The question of whether a patent claim encompasses statutory subject matter should not focus on which of the four categories of subject matter a claim is directed to, namely, process, machine, manufacture, or composition of matter, but rather on the essential characteristics of the subject matter, in particular, its practical utility. 35 U.S.C.A. § 101.

11. Patents ⇐7.14

Business methods are subject to same legal requirements for patentability as applied to any other process or method, and thus there is no "business method" exception to patentability. 35 U.S.C.A. § 101.

William L. Patton, Ropes & Gray, Boston, Massachusetts, argued for plaintiff-appellee. With him on the brief were James L. Sigel and James S. DeGraw. Also on the brief was Maurice E. Gauthier, Samuels, Gauthier, Stevens & Reppert.

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Robert C. Scheinfeld, Baker & Botts, L.L.P., New York, New York, for amicus curiae Mastercard International Service. With him on the brief was Lawrence T. Kass. Of counsel on the brief for amicus curiae VISA International Service Association were Laurie S. Hane, Donald S. Chisum, and Alan L. Durham, Morrison & Foerster LLP, Palo Alto, California.

Before RICH, PLAGER, and BRYSON, Circuit Judges.

RICH, Circuit Judge.

Signature Financial Group, Inc. (Signature) appeals from the decision of the United States District Court for the District of Massachusetts granting a motion for summary judgment in favor of State Street Bank & Trust Co. (State Street), finding U.S. Patent No. 5,193,056 (the '056 patent) invalid on the ground that the claimed subject matter is not encompassed by 35 U.S.C. § 101 (1994). See *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 927 F.Supp. 502, 38 USPQ2d 1530 (D.Mass.1996). We reverse and remand because we conclude that the patent claims are directed to statutory subject matter.

#### BACKGROUND

Signature is the assignee of the '056 patent which is entitled "Data Processing System for Hub and Spoke Financial Services Configuration." The '056 patent issued to Signature on 9 March 1993, naming R. Todd Boes as the inventor. The '056 patent is generally directed to a data processing system (the system) for implementing an investment structure which was developed for use in Signature's business as an administrator and accounting agent for mutual funds. In essence, the system, identified by the proprietary name Hub and Spoke®, facilitates a structure whereby mutual funds (Spokes) pool their assets in an investment portfolio (Hub) organized as a partnership. This investment configuration provides the administrator of a mutual fund with the advantageous combination of economies of scale in

administering investments coupled with the tax advantages of a partnership.

State Street and Signature are both in the business of acting as custodians and accounting agents for multi-tiered partnership fund financial services. State Street negotiated with Signature for a license to use its patented data processing system described and claimed in the '056 patent. When negotiations broke down, State Street brought a declaratory judgment action asserting invalidity, unenforceability, and noninfringement in Massachusetts district court, and then filed a motion for partial summary judgment of patent invalidity for failure to claim statutory subject matter under § 101. The motion was granted and this appeal followed.

#### DISCUSSION

[1-3] On appeal, we are not bound to give deference to the district court's grant of summary judgment, but must make an independent determination that the standards for summary judgment have been met. *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1560, 19 USPQ2d 1111, 1114 (Fed.Cir.1991). Summary judgment is properly granted where there are no genuine issues of material fact and the moving party is entitled to judgment as a matter of law. Fed.R.Civ.P. 56(c). The substantive issue at hand, whether the '056 patent is invalid for failure to claim statutory subject matter under § 101, is a matter of both claim construction and statutory construction. "[W]e review claim construction *de novo* including any allegedly fact-based questions relating to claim construction." *Cybor Corp. v. FAS Techs.*, 138 F.3d 1448, 1451, 46 USPQ2d 1169, 1174 (Fed.Cir.1998) (*in banc*). We also review statutory construction *de novo*. See *Romero v. United States*, 38 F.3d 1204, 1207 (Fed.Cir.1994). We hold that declaratory judgment plaintiff State Street was not entitled to the grant of summary judgment of invalidity of the '056 patent under § 101 as a matter of law, because the patent claims are directed to statutory subject matter.

The following facts pertinent to the statutory subject matter issue are either undisputed or represent the version alleged by the nonmovant. See *Anderson v. Liberty Lobby*,

STATE STREET BANK & TRUST CO. v. SIGNATURE FINANCIAL 1371

Cite as 149 F.3d 1368 (Fed. Cir. 1998)

*Inc.*, 477 U.S. 242, 255, 106 S.Ct. 2505, 91 L.Ed.2d 202 (1986). The patented invention relates generally to a system that allows an administrator to monitor and record the financial information flow and make all calculations necessary for maintaining a partner fund financial services configuration. As previously mentioned, a partner fund financial services configuration essentially allows several mutual funds, or "Spokes," to pool their investment funds into a single portfolio, or "Hub," allowing for consolidation of, inter alia, the costs of administering the fund combined with the tax advantages of a partnership. In particular, this system provides means for a daily allocation of assets for two or more Spokes that are invested in the same Hub. The system determines the percentage share that each Spoke maintains in the Hub, while taking into consideration daily changes both in the value of the Hub's investment securities and in the concomitant amount of each Spoke's assets.

In determining daily changes, the system also allows for the allocation among the Spokes of the Hub's daily income, expenses, and net realized and unrealized gain or loss, calculating each day's total investments based on the concept of a book capital account. This enables the determination of a true asset value of each Spoke and accurate calculation of allocation ratios between or among the Spokes. The system additionally tracks all the relevant data determined on a daily basis for the Hub and each Spoke, so that aggregate year end income, expenses, and capital gain or loss can be determined for accounting and for tax purposes for the Hub and, as a result, for each publicly traded Spoke.

It is essential that these calculations are quickly and accurately performed. In large part this is required because each Spoke sells shares to the public and the price of those shares is substantially based on the Spoke's percentage interest in the portfolio. In some instances, a mutual fund administrator is required to calculate the value of the shares to the nearest penny within as little as an hour and a half after the market closes. Given the complexity of the calculations, a computer or equivalent device is a virtual necessity to perform the task.

The '056 patent application was filed 11 March 1991. It initially contained six "machine" claims, which incorporated means-plus-function clauses, and six method claims. According to Signature, during prosecution the examiner contemplated a § 101 rejection for failure to claim statutory subject matter. However, upon cancellation of the six method claims, the examiner issued a notice of allowance for the remaining present six claims on appeal. Only claim 1 is an independent claim.

[4] The district court began its analysis by construing the claims to be directed to a process, with each "means" clause merely representing a step in that process. However, "machine" claims having "means" clauses may only be reasonably viewed as process claims if there is no supporting structure in the written description that corresponds to the claimed "means" elements. *See In re Alappat*, 33 F.3d 1526, 1540-41, 31 USPQ2d 1545, 1554 (Fed.Cir.1994) (*in banc*). This is not the case now before us.

[5] When independent claim 1 is properly construed in accordance with § 112, ¶ 6, it is directed to a machine, as demonstrated below, where representative claim 1 is set forth, the subject matter in brackets stating the structure the written description discloses as corresponding to the respective "means" recited in the claims.

1. A data processing system for managing a financial services configuration of a portfolio established as a partnership, each partner being one of a plurality of funds, comprising:

- (a) computer processor means [a personal computer including a CPU] for processing data;
- (b) storage means [a data disk] for storing data on a storage medium;
- (c) first means [an arithmetic logic circuit configured to prepare the data disk to magnetically store selected data] for initializing the storage medium;
- (d) second means [an arithmetic logic circuit configured to retrieve information from a specific file, calculate incremental increases or decreases based on specific input, allocate the results on a percentage basis, and store the output in a

separate file] for processing data regarding assets in the portfolio and each of the funds from a previous day and data regarding increases or decreases in each of the funds, [sic, funds'] assets and for allocating the percentage share that each fund holds in the portfolio;

(e) third means [an arithmetic logic circuit configured to retrieve information from a specific file, calculate incremental increases and decreases based on specific input, allocate the results on a percentage basis and store the output in a separate file] for processing data regarding daily incremental income, expenses, and net realized gain or loss for the portfolio and for allocating such data among each fund;

(f) fourth means [an arithmetic logic circuit configured to retrieve information from a specific file, calculate incremental increases and decreases based on specific input, allocate the results on a percentage basis and store the output in a separate file] for processing data regarding daily net unrealized gain or loss for the portfolio and for allocating such data among each fund; and

(g) fifth means [an arithmetic logic circuit configured to retrieve information from specific files, calculate that information on an aggregate basis and store the output in a separate file] for processing data regarding aggregate year-end income, expenses, and capital gain or loss for the portfolio and each of the funds.

Each claim component, recited as a "means" plus its function, is to be read, of course, pursuant to § 112, ¶ 6, as inclusive of the "equivalents" of the structures disclosed in

the written description portion of the specification. Thus, claim 1, properly construed, claims a machine, namely, a data processing system for managing a financial services configuration of a portfolio established as a partnership, which machine is made up of, at the very least, the specific structures disclosed in the written description and corresponding to the means-plus-function elements (a)-(g) recited in the claim. A "machine" is proper statutory subject matter under § 101. We note that, for the purposes of a § 101 analysis, it is of little relevance whether claim 1 is directed to a "machine" or a "process," as long as it falls within at least one of the four enumerated categories of patentable subject matter, "machine" and "process" being such categories.

This does not end our analysis, however, because the court concluded that the claimed subject matter fell into one of two alternative judicially-created exceptions to statutory subject matter.<sup>1</sup> The court refers to the first exception as the "mathematical algorithm" exception and the second exception as the "business method" exception. Section 101 reads:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The plain and unambiguous meaning of § 101 is that any invention falling within one of the four stated categories of statutory subject matter may be patented, provided it meets the other requirements for patentability set forth in Title 35, i.e., those found in §§ 102, 103, and 112, ¶ 2.<sup>2</sup>

1. Indeed, although we do not make this determination here, the judicially created exceptions, i.e., abstract ideas, laws of nature, etc., should be applicable to all categories of statutory subject matter, as our own precedent suggests. See *Alappat*, 33 F.3d at 1542, 31 USPQ2d at 1556; see also *In re Johnston*, 502 F.2d 765, 183 USPQ 172 (CCPA 1974) (Rich, J., dissenting).

2. As explained in *In re Bergy*, 596 F.2d 952, 960, 201 USPQ 352, 360 (CCPA 1979) (emphases and footnote omitted):

The first door which must be opened on the difficult path to patentability is § 101 .... The person approaching that door is an inventor, whether his invention is patentable or not .... Being an inventor or having an invention, how-

ever, is no guarantee of opening even the first door. What kind of an invention or discovery is it? In dealing with the question of kind, as distinguished from the qualitative conditions which make the invention patentable, § 101 is broad and general; its language is: "any \* \* \* process, machine, manufacture, or composition of matter, or any \* \* \* improvement thereof." Section 100(b) further expands "process" to include "art or method, and \* \* \* a new use of a known process, machine, manufacture, composition of matter, or material." If the invention, as the inventor defines it in his claims (pursuant to § 112, second paragraph), falls into any one of the named categories, he is allowed to pass through to the second door, which is § 102; "novelty and loss of right to patent" is the sign

[6] The repetitive use of the expansive term "any" in § 101 shows Congress's intent not to place any restrictions on the subject matter for which a patent may be obtained beyond those specifically recited in § 101. Indeed, the Supreme Court has acknowledged that Congress intended § 101 to extend to "anything under the sun that is made by man." *Diamond v. Chakrabarty*, 447 U.S. 303, 309, 100 S.Ct. 2204, 65 L.Ed.2d 144 (1980); see also *Diamond v. Diehr*, 450 U.S. 175, 182, 101 S.Ct. 1048, 67 L.Ed.2d 155 (1981).<sup>3</sup> Thus, it is improper to read limitations into § 101 on the subject matter that may be patented where the legislative history indicates that Congress clearly did not intend such limitations. See *Chakrabarty*, 447 U.S. at 308, 100 S.Ct. 2204 ("We have also cautioned that courts 'should not read into the patent laws limitations and conditions which the legislature has not expressed.'" (citations omitted)).

#### *The "Mathematical Algorithm" Exception*

The Supreme Court has identified three categories of subject matter that are unpatentable, namely "laws of nature, natural phenomena, and abstract ideas." *Diehr*, 450 U.S. at 185, 101 S.Ct. 1048. Of particular relevance to this case, the Court has held that mathematical algorithms are not patentable subject matter to the extent that they are merely abstract ideas. See *Diehr*, 450 U.S. 175, 101 S.Ct. 1048, *passim*; *Parker v. Flook*, 437 U.S. 584, 98 S.Ct. 2522, 57 L.Ed.2d 451 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 93 S.Ct. 253, 34 L.Ed.2d 273 (1972). In *Diehr*, the Court explained that certain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas until reduced to some type of practical application, i.e., "a useful, concrete and tangible result." *Alappat*, 33 F.3d at 1544, 31 USPQ2d at 1557.<sup>4</sup>

on it. Notwithstanding the words "new and useful" in § 101, the invention is not examined under that statute for novelty because that is not the statutory scheme of things or the long-established administrative practice.

3. The Committee Reports accompanying the 1952 Act inform us that Congress intended statutory subject matter to "include anything under the sun that is made by man." S.Rep. No. 82-

[7] Unpatentable mathematical algorithms are identifiable by showing they are merely abstract ideas constituting disembodied concepts or truths that are not "useful." From a practical standpoint, this means that to be patentable an algorithm must be applied in a "useful" way. In *Alappat*, we held that data, transformed by a machine through a series of mathematical calculations to produce a smooth waveform display on a rasterizer monitor, constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it produced "a useful, concrete and tangible result"—the smooth waveform.

Similarly, in *Arrhythmia Research Technology Inc. v. Corazonix Corp.*, 958 F.2d 1053, 22 USPQ2d 1033 (Fed.Cir.1992), we held that the transformation of electrocardiograph signals from a patient's heartbeat by a machine through a series of mathematical calculations constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it corresponded to a useful, concrete or tangible thing—the condition of a patient's heart.

[8] Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces "a useful, concrete and tangible result"—a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.

The district court erred by applying the Freeman-Walter-Abele test to determine whether the claimed subject matter was an unpatentable abstract idea. The Freeman-Walter-Abele test was designed by the Court

1979 at 5 (1952); H.R.Rep. No. 82-1923 at 6 (1952).

4. This has come to be known as the mathematical algorithm exception. This designation has led to some confusion, especially given the Freeman-Walter-Abele analysis. By keeping in mind that the mathematical algorithm is unpatentable only to the extent that it represents an abstract idea, this confusion may be ameliorated.

of Customs and Patent Appeals, and subsequently adopted by this court, to extract and identify unpatentable mathematical algorithms in the aftermath of *Benson* and *Flook*. See *In re Freeman*, 573 F.2d 1237, 197 USPQ 464 (CCPA 1978) as modified by *In re Walter*, 618 F.2d 758, 205 USPQ 397 (CCPA 1980). The test has been thus articulated:

First, the claim is analyzed to determine whether a mathematical algorithm is directly or indirectly recited. Next, if a mathematical algorithm is found, the claim as a whole is further analyzed to determine whether the algorithm is "applied in any manner to physical elements or process steps," and, if it is, it "passes muster under § 101."

*In re Pardo*, 684 F.2d 912, 915, 214 USPQ 673, 675-76 (CCPA 1982) (citing *In re Abele*, 684 F.2d 902, 214 USPQ 682 (CCPA 1982)).<sup>5</sup>

[9] After *Diehr* and *Chakrabarty*, the Freeman-Walter-Abele test has little, if any, applicability to determining the presence of statutory subject matter. As we pointed out in *Alappat*, 33 F.3d at 1543, 31 USPQ2d at 1557, application of the test could be mislead-

ing, because a process, machine, manufacture, or composition of matter employing a law of nature, natural phenomenon, or abstract idea is patentable subject matter even though a law of nature, natural phenomenon, or abstract idea would not, by itself, be entitled to such protection.<sup>6</sup> The test determines the presence of, for example, an algorithm. Under *Benson*, this may have been a sufficient indicium of nonstatutory subject matter. However, after *Diehr* and *Alappat*, the mere fact that a claimed invention involves inputting numbers, calculating numbers, outputting numbers, and storing numbers, in and of itself, would not render it nonstatutory subject matter, unless, of course, its operation does not produce a "useful, concrete and tangible result." *Alappat*, 33 F.3d at 1544, 31 USPQ2d at 1557.<sup>7</sup> After all, as we have repeatedly stated,

every step-by-step process, be it electronic or chemical or mechanical, involves an algorithm in the broad sense of the term. Since § 101 expressly includes processes as a category of inventions which may be patented and § 100(b) further defines the word "process" as meaning "process, art or

with the aid of knowledge of scientific truth may be.").

[W]hen a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101.

*Diehr*, 450 U.S. at 192, 101 S.Ct. 1048; see also *In re Iwahashi*, 888 F.2d 1370, 1375, 12 USPQ2d 1908, 1911 (Fed.Cir.1989); *Taner*, 681 F.2d at 789, 214 USPQ at 680. The dispositive inquiry is whether the claim as a whole is directed to statutory subject matter. It is irrelevant that a claim may contain, as part of the whole, subject matter which would not be patentable by itself. "A claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program or digital computer." *Diehr*, 450 U.S. at 187, 101 S.Ct. 1048.

7. As the Supreme Court expressly stated in *Diehr*, its own holdings in *Benson* and *Flook* "stand for no more than these long-established principles" that abstract ideas and natural phenomena are not patentable. *Diehr*, 450 U.S. at 185, 101 S.Ct. 1048 (citing *Chakrabarty*, 447 U.S. at 309, 100 S.Ct. 2204 and *Funk Bros.*, 333 U.S. at 130, 68 S.Ct. 440.).

5. The test has been the source of much confusion. In *In re Abele*, 684 F.2d 902, 214 USPQ 682 (CCPA 1982), the CCPA upheld claims applying "a mathematical formula within the context of a process which encompasses significantly more than the algorithm alone." *Id.* at 909. Thus, the CCPA apparently inserted an additional consideration—the significance of additions to the algorithm. The CCPA appeared to abandon the application of the test in *In re Taner*, 681 F.2d 787, 214 USPQ 678 (CCPA 1982), only to subsequently "clarify" that the Freeman-Walter-Abele test was simply not the exclusive test for detecting unpatentable subject matter. *In re Meyer*, 688 F.2d 789, 796, 215 USPQ 193, 199 (CCPA 1982).

6. See e.g. *Parker v. Flook*, 437 U.S. 584, 590, 98 S.Ct. 2522, 57 L.Ed.2d 451 (1978) ("[A] process is not unpatentable simply because it contains a law of nature or a mathematical algorithm."); *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130, 68 S.Ct. 440, 92 L.Ed. 588 (1948) ("He who discovers a hitherto unknown phenomenon of nature has no claim to a monopoly of it which the law recognizes. If there is to be invention from such a discovery, it must come from the application of the law to a new and useful end."); *Mackay Radio & Tel. Co. v. Radio Corp. of Am.*, 306 U.S. 86, 94, 59 S.Ct. 427, 83 L.Ed. 506 (1939) ("While a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created

method, and includes a new use of a known process, machine, manufacture, composition of matter, or material," it follows that it is no ground for holding a claim is directed to nonstatutory subject matter to say it includes or is directed to an algorithm. This is why the proscription against patenting has been limited to *mathematical algorithms*....

*In re Iwahashi*, 888 F.2d 1370, 1374, 12 USPQ2d 1908, 1911 (Fed.Cir.1989) (emphasis in the original).<sup>8</sup>

[10] The question of whether a claim encompasses statutory subject matter should not focus on *which* of the four categories of subject matter a claim is directed to<sup>9</sup>—process, machine, manufacture, or composition of matter—but rather on the essential characteristics of the subject matter, in particular, its practical utility. Section 101 specifies that statutory subject matter must also satisfy the other "conditions and requirements" of Title 35, including novelty, nonobviousness, and adequacy of disclosure and notice. See *In re Warmerdam*, 33 F.3d 1354, 1359, 31 USPQ2d 1754, 1757–58 (Fed.Cir.1994). For purpose of our analysis, as noted above, claim 1 is directed to a machine programmed with the Hub and Spoke software and admittedly produces a "useful, concrete, and tangible result." *Alappat*, 33 F.3d at 1544, 31 USPQ2d at 1557. This renders it statutory subject matter, even if the useful result is expressed in numbers, such as price, profit, percentage, cost, or loss.

8. In *In re Pardo*, 684 F.2d 912 (CCPA 1982), the CCPA narrowly limited "mathematical algorithm" to the execution of formulas with given data. In the same year, in *In re Meyer*, 688 F.2d 789, 215 USPQ 193 (CCPA 1982), the CCPA interpreted the same term to include any mental process that can be represented by a mathematical algorithm. This is also the position taken by the PTO in its Examination Guidelines, 61 Fed. Reg. 7478, 7483 (1996).

9. Of course, the subject matter must fall into at least one category of statutory subject matter.

10. As Judge Newman has previously stated, [The business method exception] is ... an unwarranted encumbrance to the definition of statutory subject matter in section 101, that [should] be discarded as error-prone, redundant, and obsolete. It merits retirement from the glossary of section 101.... All of the "doing business" cases could have been decided using the clearer concepts of Title 35. Pat-

### *The Business Method Exception*

[11] As an alternative ground for invalidating the '056 patent under § 101, the court relied on the judicially-created, so-called "business method" exception to statutory subject matter. We take this opportunity to lay this ill-conceived exception to rest. Since its inception, the "business method" exception has merely represented the application of some general, but no longer applicable legal principle, perhaps arising out of the "requirement for invention"—which was eliminated by § 103. Since the 1952 Patent Act, business methods have been, and should have been, subject to the same legal requirements for patentability as applied to any other process or method.<sup>10</sup>

The business method exception has never been invoked by this court, or the CCPA, to deem an invention unpatentable.<sup>11</sup> Application of this particular exception has always been preceded by a ruling based on some clearer concept of Title 35 or, more commonly, application of the abstract idea exception based on finding a mathematical algorithm. Illustrative is the CCPA's analysis in *In re Howard*, 55 C.C.P.A. 1121, 394 F.2d 869, 157 USPQ 615 (CCPA 1968), wherein the court affirmed the Board of Appeals' rejection of the claims for lack of novelty and found it unnecessary to reach the Board's section 101 ground that a method of doing business is "inherently unpatentable." *Id.* at 872, 55 C.C.P.A. 1121, 394 F.2d 869, 157 USPQ at 617.<sup>12</sup>

entability does not turn on whether the claimed method does "business" instead of something else, but on whether the method, viewed as a whole, meets the requirements of patentability as set forth in Sections 102, 103, and 112 of the Patent Act.

*In re Schrader*, 22 F.3d 290, 298, 30 USPQ2d 1455, 1462 (Fed.Cir.1994) (Newman, J., dissenting).

11. See Rinaldo Del Gallo, III, *Are "Methods of Doing Business" Finally out of Business as a Statutory Rejection?*, 38 IDEA 403, 435 (1998).

12. See also *Dann v. Johnston*, 425 U.S. 219, 96 S.Ct. 1393, 47 L.Ed.2d 692 (1976) (the Supreme Court declined to discuss the section 101 argument concerning the computerized financial record-keeping system, in view of the Court's holding of patent invalidity under section 103); *In re Chatfield*, 545 F.2d 152, 157, 191 USPQ 730, 735 (CCPA 1976); *Ex parte Murray*, 9 USPQ2d 1819,



Similarly, *In re Schrader*, 22 F.3d 290, 30 USPQ2d 1455 (Fed.Cir.1994), while making reference to the business method exception, turned on the fact that the claims implicitly recited an abstract idea in the form of a mathematical algorithm and there was no "transformation or conversion of subject matter representative of or constituting physical activity or objects." 22 F.3d at 294, 30 USPQ2d at 1459 (emphasis omitted).<sup>13</sup>

State Street argues that we acknowledged the validity of the business method exception in *Alappat* when we discussed *Maucorps* and *Meyer*:

*Maucorps* dealt with a business methodology for deciding how salesmen should best handle respective customers and *Meyer* involved a "system" for aiding a neurologist in diagnosing patients. Clearly, neither of the alleged "inventions" in those cases falls within any § 101 category.

*Alappat*, 33 F.3d at 1541, 31 USPQ2d at 1555. However, closer scrutiny of these cases reveals that the claimed inventions in both *Maucorps* and *Meyer* were rejected as abstract ideas under the mathematical algorithm exception, not the business method exception. See *In re Maucorps*, 609 F.2d 481, 484, 203 USPQ 812, 816 (CCPA 1979); *In re Meyer*, 688 F.2d 789, 796, 215 USPQ 193, 199 (CCPA 1982).<sup>14</sup>

1820 (Bd.Pat.App. & Interf. 1988) ("[T]he claimed accounting method [requires] no more than the entering, sorting, debiting and totaling of expenditures as necessary preliminary steps to issuing an expense analysis statement . . .") states grounds of obviousness or lack of novelty, not of non-statutory subject matter.

13. Any historical distinctions between a method of "doing" business and the means of carrying it out blur in the complexity of modern business systems. See *Paine, Webber, Jackson & Curtis v. Merrill Lynch*, 564 F.Supp. 1358, 218 USPQ 212 (D.Del.1983), (holding a computerized system of cash management was held to be statutory subject matter.)

14. Moreover, these cases were subject to the *Benson* era Freeman-Walter-Abele test—in other words, analysis as it existed before *Diehr* and *Alappat*.

15. See also *Loew's Drive-in Theatres v. Park-in Theatres*, 174 F.2d 547, 552 (1st Cir.1949) (holding that the means for carrying out the system of transacting business lacked "an exercise of the

Even the case frequently cited as establishing the business method exception to statutory subject matter, *Hotel Security Checking Co. v. Lorraine Co.*, 160 F. 467 (2d Cir.1908), did not rely on the exception to strike the patent.<sup>15</sup> In that case, the patent was found invalid for lack of novelty and "invention," not because it was improper subject matter for a patent. The court stated "the fundamental principle of the system is as old as the art of bookkeeping, i.e., charging the goods of the employer to the agent who takes them." *Id.* at 469. "If at the time of [the patent] application, there had been no system of bookkeeping of any kind in restaurants, we would be confronted with the question whether a new and useful system of cash registering and account checking is such an art as is patentable under the statute." *Id.* at 472.

This case is no exception. The district court announced the precepts of the business method exception as set forth in several treatises, but noted as its primary reason for finding the patent invalid under the business method exception as follows:

If Signature's invention were patentable, any financial institution desirous of implementing a multi-tiered funding complex modelled (sic) on a Hub and Spoke configuration would be required to seek Signature's permission before embarking on

faculty of invention"); *In re Patton*, 29 C.C.P.A. 982, 127 F.2d 324, 327-28 (CCPA 1942) (finding claims invalid as failing to define patentable subject matter over the references of record.); *Berardini v. Tocci*, 190 F. 329, 332 (C.C.S.D.N.Y. 1911); *In re Wait*, 22 C.C.P.A. 822, 73 F.2d 982, 983 (CCPA 1934) ("[S]urely these are, and always have been, essential steps in all dealings of this nature, and even conceding, without holding, that some methods of doing business might present patentable novelty, we think such novelty is lacking here."); *In re Howard*, 55 C.C.P.A. 1121, 394 F.2d 869, 157 USPQ 615, 617 (CCPA 1968) ("[W]e therefore affirm the decision of the Board of Appeals on the ground that the claims do not define a novel process [so we find it] unnecessary to consider the issue of whether a method of doing business is inherently unpatentable."). Although a clearer statement was made in *In re Patton*, 29 C.C.P.A. 982, 127 F.2d 324, 327, 53 USPQ 376, 379 (CCPA 1942) that a system for transacting business, separate from the means for carrying out the system, is not patentable subject matter, the jurisprudence does not require the creation of a distinct business class of unpatentable subject matter.

such a project. *This is so because the '056 Patent is claimed [sic] sufficiently broadly to foreclose virtually any computer-implemented accounting method necessary to manage this type of financial structure.*

further proceedings consistent with this opinion.

REVERSED and REMANDED.



927 F.Supp. 502, 516, 38 USPQ2d 1530, 1542 (emphasis added). Whether the patent's claims are too broad to be patentable is not to be judged under § 101, but rather under §§ 102, 103 and 112. Assuming the above statement to be correct, it has nothing to do with whether what is claimed is statutory subject matter.

In view of this background, it comes as no surprise that in the most recent edition of the Manual of Patent Examining Procedures (MPEP) (1996), a paragraph of § 706.03(a) was deleted. In past editions it read:

Though seemingly within the category of process or method, a method of doing business can be rejected as not being within the statutory classes. *See Hotel Security Checking Co. v. Lorraine Co.*, 160 F. 467 (2d Cir.1908) and *In re Wait*, 24 USPQ 88, 22 C.C.P.A. 822, 73 F.2d 982 (1934).

MPEP § 706.03(a) (1994). This acknowledgment is buttressed by the U.S. Patent and Trademark 1996 Examination Guidelines for Computer Related Inventions which now read:

Office personnel have had difficulty in properly treating claims directed to methods of doing business. Claims should not be categorized as methods of doing business. Instead such claims should be treated like any other process claims.

Examination Guidelines, 61 Fed.Reg. 7478, 7479 (1996). We agree that this is precisely the manner in which this type of claim should be treated. Whether the claims are directed to subject matter within § 101 should not turn on whether the claimed subject matter does "business" instead of something else.

LOCKHEED MARTIN CORPORATION,  
Appellant,

v.

Robert M. WALKER, Secretary  
of the Army, Appellee.

No. 97-1469.

United States Court of Appeals,  
Federal Circuit.

July 23, 1998.

Government contractor appealed contracting officer's denial of its claim for equitable adjustments under its fixed price contract to supply missile fuses to federal government, which was based on contentions that government-prepared technical data package was defective and that government's out-of-sequence option exercise was invalid. The Armed Services Board of Contract Appeals, 1997 WL 157324, upheld government's option exercise and ruled that contractor was entitled to compensation for data package deficiencies, but denied contractor total cost recovery. Contractor appealed. The Court of Appeals, Michel, Circuit Judge, held that: (1) contract required government to exercise options in sequential order, and (2) issuing determination on whether contractor was entitled to total cost recovery as damages for defective technical data package was error.

Reversed in part, vacated in part, and remanded.

#### CONCLUSION

The appealed decision is reversed and the case is remanded to the district court for

#### 1. United States ¶73(15)

Court of Appeals reviews de novo determinations of law by Armed Services Board of

witness under the business records exception. Weber testified that he had seen the documents while attending a meeting at Allied-Signal. However, he failed to testify concerning the record-keeping process related to them, a requirement for admissibility of documents under the business records exception. See Fed.R.Evid. 803(6). Thus, World failed to establish that Weber was a custodian or other qualified witness, *see id.*, and the district court thus did not abuse its discretion in excluding the documents.

#### F. Attorney Fees and Frivolous Appeal

[16] World requests damages under 35 U.S.C. § 284 as compensation for what it alleges are fraudulent acts of Kolmes. However, section 284 authorizes a court to award damages for infringement of a patent; World is the accused infringer and has not in this case prevailed in an infringement claim. Accordingly, World is not entitled to damages under section 284. World also requests an award of attorney fees under 35 U.S.C. § 285 ("The court in exceptional cases may award reasonable attorney fees to the prevailing party."). Because World is not the prevailing party, it is not entitled to attorney fees.

[17, 18] Kolmes requests an award of damages under Fed. R.App. P. 38, arguing that World's appeal is baseless. Rule 38 authorizes a court of appeals to award damages for a frivolous appeal, and we have held that appeals may be frivolous as filed or as argued. *State Indus., Inc. v. Mor-Flo Indus., Inc.*, 948 F.2d 1573, 1578, 20 USPQ2d 1738, 1742 (Fed.Cir.1991). An appeal is frivolous as filed if "no basis for reversal in law or fact can be or is even arguably shown." *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1554, 220 USPQ 193, 203 (Fed.Cir. 1983). Kolmes' request first fails for lack of a separate motion. See Fed. R.App. P. 38. On the merits, although World had many hurdles to overcome in its attempt to obtain a reversal, its appeal was not baseless and therefore was not frivolous as filed. Kolmes also argues that World's brief is misleading. We have carefully considered World's briefs

and conclude that they do not evidence any sanctionable conduct. See *State Indus.*, 948 F.2d at 1579 n. 4, 20 USPQ2d at 1743 n. 4 (listing examples of sanctionable conduct). Because we conclude that World's appeal was not frivolous as filed or as argued (even considering its unfounded claims for attorney fees or damages under sections 284 and 285), Kolmes is not entitled to damages under Rule 38.

We have considered the parties' other arguments and conclude that they are either unpersuasive or unnecessary for resolution of this appeal.

#### CONCLUSION

The district court did not err in holding that the '948 patent is not invalid. It did not abuse its discretion in holding that the patent was not obtained by means of inequitable conduct and in denying entry into evidence of the Allied-Signal documents. World is not entitled to damages under section 284 or attorney fees under section 285. Because World's appeal was not frivolous, Kolmes is not entitled to damages under Fed. R.App. P. 38.

**AFFIRMED.**



**FONAR CORPORATION and Dr. Raymond V. Damadian, Plaintiffs/Cross-Appellants,**

**v.**

**GENERAL ELECTRIC COMPANY, and Drucker & Genuth, Mds, P.C., d/b/a South Shore Imaging Associates, Defendants-Appellants.**

**Nos. 96-1075, 96-1106 and 96-1091.**

**United States Court of Appeals,  
Federal Circuit.**

**Feb. 25, 1997.**

**Rehearing Denied; Suggestion for  
Rehearing In Banc Declined**

**May 8, 1997.\***

**Patentee sued for infringement of patents concerning technique for using magnetic**

**in the vote.**

\* Circuit Judges Rich and Schall did not participate

resonance imaging (MRI) machine for multi-angle oblique (MAO) imaging and technique for using nuclear magnetic resonance (NMR) imaging to detect cancer. The United States District Court for the Eastern District of New York, Leonard D. Wexler, J., 902 F.Supp. 330, entered judgment on jury verdict in favor of patentee with respect to MAO patent but granted judgment as a matter of law (JMOL) to alleged infringer with respect to cancer detection patent. Parties appealed. The Court of Appeals, Lourie, Circuit Judge, held that: (1) MAO patent disclosed best mode; (2) MAO patent was infringed; (3) patentee was entitled to \$34 million for infringement of MAO patent; (4) lapse of MAO patent for failure to pay maintenance fees did not preclude finding of infringement; (5) alleged infringer did not induce infringement of MAO patent; and (6) cancer detection patent was infringed under doctrine of equivalents.

Affirmed in part and reversed in part.

#### 1. Federal Courts ⇨765

On appeal from judgment denying motion for judgment as a matter of law (JMOL) following jury trial, appellant must show that jury's findings, presumed or express, are not supported by substantial evidence or, if they were, that legal conclusion(s) implied from jury's verdict cannot in law be supported by those findings.

#### 2. Patents ⇨98

Determining whether patent satisfies best mode requirement involves two factual inquiries: first, fact finder must determine whether at time applicant filed application for patent, he or she had a best mode of practicing the invention, which is a subjective determination; second, if inventor had a best mode of practicing invention, fact finder must determine whether best mode was disclosed in sufficient detail to allow one skilled in the art to practice it, which is an objective determination. 35 U.S.C.A. § 112.

#### 3. Patents ⇨98

Patent concerning technique for using magnetic resonance imaging (MRI) machine

for multi-angle oblique (MAO) imaging satisfied best mode requirement, even though patent contained description of software's functions rather than disclosing computer code. 35 U.S.C.A. § 112.

#### 4. Patents ⇨98

As a general rule, where software constitutes part of best mode of carrying out invention, description of such a best mode is satisfied by disclosure of functions of software. 35 U.S.C.A. § 112.

#### 5. Patents ⇨98

Flow charts or source code listings are not a requirement for adequately disclosing functions of software, for purpose of satisfying best mode requirement of patent. 35 U.S.C.A. § 112.

#### 6. Patents ⇨226.6

Determining whether patent claim has been infringed requires two-step analysis: first, claim must be properly construed to determine its scope and meaning; second, claim as properly construed must be compared to accused device or process.

#### 7. Patents ⇨235(2)

Patent concerning technique for using magnetic resonance imaging (MRI) machine for multi-angle oblique (MAO) imaging was infringed by accused MRI scanners.

#### 8. Patents ⇨167(1)

If apparatus claim of patent does not recite definite structure in specification to support function in means clause, court construes means limitation in light of corresponding structure or acts disclosed in specification and their equivalents. 35 U.S.C.A. § 112.

#### 9. Patents ⇨319(1)

Entire market value rule allows for recovery of damages based on value of entire apparatus containing several features, even though only one feature is patented, when patented feature is the basis for customer demand for entire machine. 35 U.S.C.A. § 284.

**10. Patents ⇌319(1)**

Evidence supported award of reasonable royalty based upon cost of entire machine as damages for infringement of patent concerning technique for using magnetic resonance imaging (MRI) machine for multi-angle oblique (MAO) imaging, even though only the MAO feature of machine was patented; infringer's own technical literature emphasized MAO feature. 35 U.S.C.A. § 284.

**11. Patents ⇌319(1)**

Evidence supported award of reasonable royalty damages of \$34.125 million for infringement of patent concerning technique for using magnetic resonance imaging (MRI) machine for multi-angle oblique (MAO) imaging; patentee's expert witness testified that reasonable royalty would have resulted in royalty of \$54 million; there were no acceptable noninfringing alternatives, and patentee had capacity to manufacture machines whose sales it lost. 35 U.S.C.A. § 284.

**12. Patents ⇌318(1)**

In order to be entitled to lost profits, patentee must show reasonable probability that it would have made sales but for infringement. 35 U.S.C.A. § 284.

**13. Patents ⇌312(1.7)**

Patentee may establish inference of entitlement to lost profits from infringer by means of four-factor *Panduit* test, requiring proof of demand for the patented product, lack of acceptable noninfringing substitutes, capacity by patentee to meet demand, and amount of profit patentee would have made; burden then shifts to infringer to show that inference is unreasonable for some or all of the lost sales. 35 U.S.C.A. § 284.

**14. Patents ⇌283(1)**

Statute protecting person who makes, purchases, or uses anything protected by patent during period in which patent has lapsed for failure to pay maintenance fee applies only to persons who first began to make, purchase, or use thing protected by patent during lapse period; it does not im-

munize discreet products made, used, or sold as part of continuing commercial effort begun before lapse. 35 U.S.C.(1984 Ed.) § 41(c)(2).

**15. Patents ⇌259(1)**

Manufacturer of magnetic resonance imaging (MRI) scanners that infringed patent did not induce infringement of patent by continuing to service unmarked scanners after manufacturer received notice of patent. 35 U.S.C.A. § 287(a).

**16. Patents ⇌255**

If patented machine was sold under circumstances that did not subject its seller to damages, then subsequent repair cannot subject seller to damages.

**17. Patents ⇌255**

One is entitled to repair that which is sold free of liability for patent infringement.

**18. Patents ⇌237**

Patent infringement under doctrine of equivalents requires proof of insubstantial differences between claimed and accused products or processes.

**19. Patents ⇌314(5), 324.5**

Infringement of patent under doctrine of equivalents is a question of fact, which appellate court reviews for substantial evidence on appeal from grant of motion for judgment as a matter of law (JMOL).

**20. Patents ⇌237**

Under doctrine of equivalents, patent concerning technique for using nuclear magnetic resonance (NMR) imaging to detect cancer was infringed by accused machines.

Ronald J. Schutz, Robins, Kaplan, Miller & Ciresi, Minneapolis, Minnesota, argued for the plaintiffs/cross-appellants. With him on the brief were Martin R. Lueck, William L. Norine, and Darren B. Schwiebert.

Donald R. Dunner, Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P., Wash-

ington, DC, argued for the defendants-appellants. With him on the brief were Thomas H. Jenkins and J. Michael Jakes. Also with him on the brief were Carter G. Phillips, Mark E. Haddad, Paul E. Kalb, and Denise W. DeFranco, Sidley & Austin, Washington, DC, Benjamin W. Heineman, Jr., Erwin F. Berrier, Jr., and Molly B. Burke, General Electric Company, Fairfield, Connecticut, Ronald W. O'Keefe and Robert R. Schroeder, General Electric Company, Medical Systems Group, Milwaukee, Wisconsin.

Before LOURIE, Circuit Judge,  
SKELTON, Senior Circuit Judge, and  
RADER, Circuit Judge.

LOURIE, Circuit Judge.

General Electric Company, and Drucker & Genuth, MDS, P.C., d/b/a South Shore Imaging Associates (collectively "GE") appeal from the judgment of the United States District Court for the Eastern District of New York denying their motion for judgment as a matter of law ("JMOL") and sustaining a jury's verdict that (1) U.S. Patent 4,871,966 was not invalid and (2) GE infringed the '966 patent and was liable for lost profits and reasonable royalty damages. *Fonar Corp. v. General Elec. Co.*, 902 F.Supp. 330 (E.D.N.Y. 1995). Fonar Corporation and Dr. Raymond V. Damadian (collectively "Fonar") cross-appeal from the district court's judgment granting a motion for JMOL that GE did not induce infringement of the '966 patent and did not infringe U.S. Patent 3,789,832. *Id.* Because the district court erred in its JMOL that GE did not infringe the '832 patent, but did not otherwise err, we affirm-in-part and reverse-in-part.

#### BACKGROUND

The '966 patent concerns a technique for using a magnetic resonance imaging ("MRI") machine in order to obtain multiple image slices of a patient's body at different angles in a single scan, referred to as multi-angle oblique ("MAO") imaging. Prior art machines were able to obtain multiple parallel

images along the same axis in a single scan, but they required multiple scans in order to obtain multiple images at varying angles. MAO resulted in shortened imaging times and hence allowed for the imaging of more patients per day. Claim 1 of the '966 patent recites this feature and reads in part:

1. A method for obtaining in the course of a single scan NMR [nuclear magnetic resonance] image data for a plurality of differently oriented selected planes in an object using nuclear magnetic resonance techniques, said method comprising the steps of:

(a) positioning an object in a static homogeneous magnetic field;

(b) determining first and second selected planes in said object for which NMR image data is to be obtained . . .

(c) subjecting said object to a plurality of repetitions of a first repetition sequence composed of NMR excitation and magnetic gradient field pulses, each of said repetitions of said first repetition sequence including the steps of applying an excitation pulse and reading out of an NMR signal produced by said excitation pulse . . . said plurality of repetitions of said first repetition sequence being carried out in a manner to encode spatial information into a first collection of said NMR signals, said first collection of NMR signals being representative of NMR image data for said first selected plane; and

(d) subjecting said object to a plurality of repetitions of a second repetition sequence composed of NMR excitation and magnetic field gradient pulses, each of said repetitions of said second repetition sequence including the steps of applying an excitation pulse and reading out of an NMR signal produced, by said excitation pulse . . . said plurality of repetitions of said second repetition sequence being carried out in a manner to encode spatial information into a second collection of NMR signals, said second collection of NMR signals being representative of NMR image data for said second selected plane;

said plurality of repetitions of said first and second repetition sequences each being carried out during the course of a single scan of said object and each being continued substantially throughout said single scan, the repetition time interval for repeating each of said first and second repetition sequences being substantially the same and said steps of applying an excitation pulse and reading out of an NMR signal for each repetition of said second repetition sequence being performed at a different time during said repetition time interval than each of said steps of applying an excitation pulse and reading out of an NMR signal for said first repetition sequence.

The '832 patent concerns a technique for using NMR imaging to detect cancer. MRI machines rely upon the principles of NMR to produce cross-sectional images of body tissue. The inventor, Dr. Damadian, recognized that two common NMR measurements, T1 and T2, were often different in cancerous tissue compared with normal tissue. Thus, the '832 patent claims a method for detecting cancer by measuring values of T1 and T2 in suspect tissue and comparing them to standard T1 and T2 values for normal and cancerous tissue of the same type. Claim 1 of the '832 patent recites this feature and reads:

1. A method for detecting cancer comprising:

a. measuring and establishing standard NMR spin-lattice relaxation times and spin-spin relaxation times for both normal and cancerous tissue of the type under analysis using as an indicator nuclei at least one nuclei which exhibits deviant behavior in cancerous tissue;

b. measuring the NMR spin-lattice relaxation times and spin-spin relaxation times for the suspected tissue to determine the extent of deviant behavior of the indicator nuclei; and

c. comparing the values obtained in (b) against the standards obtained in (a).

Fonar sued GE for infringement of the two patents, asserting infringement of claims 1, 2,

4, 5, and 12 of the '966 patent and claims 1 and 2 of the '832 patent. A jury returned a verdict finding that the asserted claims were not invalid and were infringed. As compensation for infringement of the '966 patent, the jury awarded Fonar \$27,825,000 as lost profits on 75 of the 600 MRI machines sold by GE and \$34,125,000 as a reasonable royalty on sales of the remaining 525 machines. The jury awarded Fonar \$13,625,000 as damages for GE's inducement to infringe the patent. It also awarded \$35,000,000 in reasonable royalty damages for GE's infringement of the '832 patent.

The court granted two of GE's renewed motions for JMOL, ruling that GE did not induce infringement of the '966 patent and that it did not infringe the '832 patent. Specifically, the court concluded that GE could not have induced infringement because it had no notice of the patent. With respect to infringement of the '832 patent, the court found that Fonar failed to establish the existence of standard T1 and T2 values, which are limitations of the asserted claims, and it thus concluded that GE did not infringe that patent.

The court denied GE's motions for JMOL relating to its assertion of a violation of the best mode requirement and to damages for direct infringement of the '966 patent. The court concluded that the testimony of Fonar's witnesses provided substantial evidence to support the jury's finding that the patent satisfied the best mode requirement, and the court found that substantial evidence supported the jury's damages findings. The court summarily denied GE's motions for JMOL relating to the other issues now on appeal. The court awarded Fonar prejudgment interest and entered a final award against GE in the amount of \$68,421,726.

GE now appeals to this court, arguing that the district court erred in its judgment concerning validity and infringement of the '966 patent and in determining damages for infringement of that patent. Fonar cross-appeals, challenging the district court's judgment concerning inducement to infringe

the '966 patent and infringement of the '832 patent.

### DISCUSSION

[1] On appeal from a judgment denying a motion for JMOL following a jury trial, an appellant "must show that the jury's findings, presumed or express, are not supported by substantial evidence or, if they were, that the legal conclusion(s) implied from the jury's verdict cannot in law be supported by those findings." *Perkin-Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 893, 221 USPQ 669, 673 (Fed.Cir.1984) (citation omitted).

#### A. Best Mode of the '966 Patent

GE argues that the patent fails to disclose two software routines, the LGRAD and GETMAO programs, which the inventors testified were the best means they knew of to accomplish MAO imaging. GE also argues that a critical aspect of the invention, a gradient multiplier board ("GMB"), was not disclosed in sufficient detail to satisfy the best mode requirement. Furthermore, GE argues that the inventors failed to identify a new integrated circuit "chip" for implementing certain functions of the hardware.

Fonar responds that its disclosure was adequate to satisfy the best mode requirement, that the specification adequately describes the functions of the software, and that it is not necessary that the actual computer program be disclosed. According to Fonar, providing a description of the software's functions is what is important for a best mode disclosure, rather than actual source code, because the code was tailored to a specific hardware embodiment and it thus would not necessarily have worked with other hardware. Fonar also argues that the '966 specification adequately disclosed the GMB and the functions of the new "chip."

[2] The patent statute requires that a patent specification "shall set forth the best mode contemplated by the inventor of carrying out his invention." 35 U.S.C. § 112

(1994). Determining whether a patent satisfies the best mode requirement involves two factual inquiries. First, a fact-finder must determine whether at the time an applicant filed an application for a patent, he or she had a best mode of practicing the invention; this is a subjective determination. Second, if the inventor had a best mode of practicing the invention, the fact-finder must determine whether the best mode was disclosed in sufficient detail to allow one skilled in the art to practice it, which is an objective determination. *United States Gypsum Co. v. National Gypsum Co.*, 74 F.3d 1209, 1212, 37 USPQ2d 1388, 1390 (Fed.Cir.1996); *Chemcast Corp. v. Arco Indus. Corp.*, 913 F.2d 923, 927-28, 16 USPQ2d 1033, 1036 (Fed.Cir.1990).

[3] We agree with Fonar that the jury's finding that the '966 patent satisfied the best mode requirement was supported by substantial evidence. There was evidence that the inventors had a best mode, and that the software, the GMB, and the "chip" were part of that best mode. However, with respect to the software routines, Fonar's witnesses testified that the '966 patent contained a sufficient description of the software's functions. Specifically, Robert Wolf, one of the inventors, testified as follows:

Q. From that written description, is there sufficient description to a software engineer, such as yourself, of what software needs to be written in order to perform the multi-angle oblique invention?

A. Yes.

Q. In any event, the software, itself, as we see in the hundred pages of Exhibit 816, is not reproduced in its entirety in the patent.

Is that right?

A. That's correct.

Q. Why is that?

A. For a few reasons.

First of all, it's large as you can see. It's several hundred pages. It wouldn't



Cite as 107 F.3d 1543 (Fed. Cir. 1997)

help someone to have that software anyway because that software only works on a Fonar machine.

What's much more important is to have a description of what the software has to do, and that is what you will find in the patent.

Fonar's witnesses further testified that providing the functions of the software was more important than providing the computer code. We agree.

[4, 5] As a general rule, where software constitutes part of a best mode of carrying out an invention, description of such a best mode is satisfied by a disclosure of the functions of the software. This is because, normally, writing code for such software is within the skill of the art, not requiring undue experimentation, once its functions have been disclosed. It is well established that what is within the skill of the art need not be disclosed to satisfy the best mode requirement as long as that mode is described. Stating the functions of the best mode software satisfies that description test. We have so held previously and we so hold today. See *In re*

*Hayes Microcomputer Prods., Inc. Patent Litigation*, 982 F.2d 1527, 1537-38, 25 USPQ2d 1241, 1248-49 (Fed. Cir. 1992); *In re Sherwood*, 613 F.2d 809, 816-17, 204 USPQ 537, 544 (CCPA 1980). Thus, flow charts or source code listings are not a requirement for adequately disclosing the functions of software. See *Sherwood*, 613 F.2d at 816-17, 204 USPQ at 544. Here, substantial evidence supports a finding that the software functions were disclosed sufficiently to satisfy the best mode requirement. See *Hayes*, 982 F.2d at 1537, 25 USPQ2d at 1248-49 (stating that there was no best mode violation where the specification failed to disclose a firmware listing or flow charts, but did disclose sufficient detail to allow one skilled in the art to develop a firmware listing for implementing the invention).

A finding that the GMB was sufficiently disclosed to satisfy the best mode requirement was also supported by substantial evidence. Fonar's witness testified that the '966 patent provided a description of the function of the GMB with reference to the components within the dotted line in Figure 7 of the '966 patent, reproduced below.

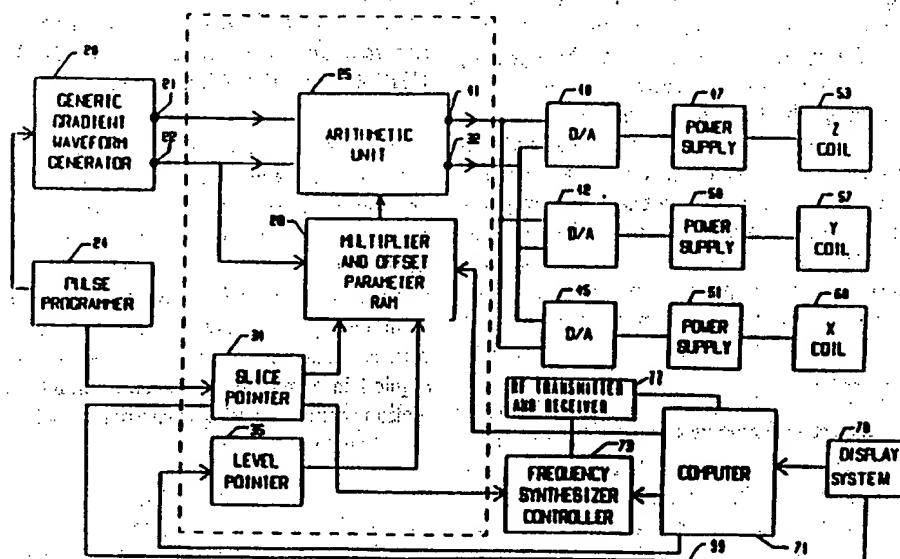


FIG. 7

David Hertz, one of the inventors, testified in particular that the patent provides a description of the functions required for one skilled in the art to build a GMB that will work with a general MRI system and that the GMB disclosed in the patent is the one built by Fonar. More importantly, he testified that the GMB used in the Fonar machine was not the only means to accomplish MAO imaging and that it was not necessarily the best way to do it for every machine. GE argues nonetheless that the '966 patent failed to disclose the use of comparators as part of the GMB, which it alleged were an essential element of the best mode. However, Hertz testified that if an MRI machine performing MAO imaging according to the '966 patent were to require a comparator as part of the GMB, a skilled engineer would know that a comparator should be used. He further testified that each MRI machine has its own set of requirements for the functionality of the GMB, which is why the '966 patent described in general terms how to build the invention. Hertz's testimony provides substantial evidence to support a finding that there was no best mode violation with respect to the GMB.

Substantial evidence also supports the finding that the functions of the new "chip" were disclosed sufficiently to satisfy the best mode requirement. The '966 patent schematically disclosed the functions of that "chip" in Figure 7 and provided a textual description of its functions. See '966 patent, col. 13, lines 41-64. Because adequate disclosure of the functions of the "chip" was in the specification, failure to specifically identify a particular manufacturer's "chip" was not fatal to satisfaction of the best mode requirement. Accordingly, the jury's finding that the '966 patent satisfied the best mode requirement was supported by substantial evidence, and the district court did not err in denying GE's motion for JMOL concerning that issue.

#### B. *Direct Infringement of the '966 Patent*

GE argues that it was entitled to a judgment that its MRI scanners did not infringe the '966 patent. According to GE, each asserted claim contains limitations subject to 35 U.S.C. § 112, ¶ 6, and Fonar submitted no evidence indicating that the accused devices

possessed the structure, material, or acts noted in the specification that performed the functions identified by the "means" or "step" limitations. GE argues that its accused scanners did not contain equivalent structure because it did not use a generic gradient wave form.

Fonar responds that the asserted claims are not limited to use of a generic gradient wave form. Fonar points to the specification, which it notes clearly states that other wave forms may be used. It also asserts that while some claims require a generic gradient wave form generator, others do not. Fonar also argues that it submitted evidence that GE's machines used the same or equivalent structure or acts for implementing the functions specified by the asserted claims. In any event, Fonar believes that most of its claims do not contain means plus function language and are accordingly not limited to structure or acts disclosed in the specification, or equivalents thereof.

[6] Determining whether a patent claim has been infringed requires a two-step analysis: "First, the claim must be properly construed to determine its scope and meaning. Second, the claim as properly construed must be compared to the accused device or process." *Carroll Touch, Inc. v. Electro Mechanical Sys., Inc.*, 15 F.3d 1573, 1576, 27 USPQ2d 1836, 1839 (Fed.Cir.1993).

[7] We first address GE's argument that the asserted claims, including method claims, are subject to section 112, ¶ 6. We deal with the method claims first. GE argues in particular that each asserted method claim invokes section 112, ¶ 6, because it was drafted "functionally in a result-oriented way" by reciting that the pulse sequences must be applied in a manner to encode spatial information without reciting structure or acts that would enable such a result.

We need not address the question whether section 112, ¶ 6, applies to these claims. That is because we agree with Fonar that the method claims looked at with or without the section 112, ¶ 6 limitation are not limited to

use of a generic gradient wave form. Although the '966 specification discloses a "generic gradient wave form generator" (20) in Figure 7, along with a corresponding description, it states that the "generator 20 also stores the phase encoding wave form, as illustrated in FIG. 2, in digital form. Preferably, the generator 20 stores these particular wave forms; but, may store others that suffice for purposes of the present invention." Col. 12, lines 42-46. The claim language in question, applying pulses in a manner to encode spatial information, does not recite use of generic gradient wave forms; it tracks the specification which states that other wave forms may be used.

There was substantial evidence to support the jury's finding that the method claims were infringed. Thomas Gafford, as expert witness for Fonar, testified that the accused devices infringed the asserted claims because they performed the steps defined in the claims using the same or equivalent acts. He stated that in forming his opinion he relied upon the technical literature, specifications, and drawings of the accused GE machines. The jury could have reasonably relied upon his testimony in rendering its verdict that the accused machines met the limitations of the asserted claims however they are interpreted; its finding of infringement is thus supported by substantial evidence.

[8] As for apparatus claim 12, it does include means clauses. The limitations that GE argues are subject to section 112, ¶ 6, are shown below with our emphasis added.

#### 12. Apparatus for ...

(c) *means* for actuating and controlling said magnetic field applying means and said radio frequency applying means to:

(1) apply a first sequence including a first slice selector magnetic field gradient in a first direction concomitantly with a first RF excitation pulse at a first frequency to thereby excite nuclei [sic] only in a first plane perpendicular to

said first direction, whereby a first NMR signal will be emitted only by nuclei [sic] in said first plane, said first sequence further including at least one encoding magnetic field gradient operative to *encode spatial information into said first NMR signal*;

(2) apply a second sequence including a second slice selector magnetic field gradient in a second direction different from said first direction concomitantly with a second RF excitation pulse at a second frequency different from said first frequency to thereby excite nuclei [sic] only in a second plane perpendicular to said second direction whereby a second NMR signal will be emitted only by nuclei [sic] in said second plane, said second sequence further including at least one encoding magnetic field gradient operative to *encode spatial information into said second NMR signal*;

An apparatus claim requires definite structure in the specification to support the function in a means clause. Because claim 12 does not recite such structure in support of the defined function, it is therefore subject to section 112, ¶ 6. See *Cole v. Kimberly-Clark Corp.*, 102 F.3d 524, 531, 41 USPQ2d 1001, 1006 (Fed.Cir.1996); see also *Greenberg v. Ethicon Endo-Surgery, Inc.*, 91 F.3d 1580, 1584, 39 USPQ2d 1783, 1787 (Fed.Cir.1996) (stating that "the use of the term 'means' has come to be so closely associated with 'means-plus-function' claiming that it is fair to say that the use of the term 'means' (particularly as used in the phrase 'means for') generally invokes section 112(6) and that the use of a different formulation generally does not."). Accordingly, we construe the "means" limitation in question in light of the corresponding structure or acts disclosed in the specification and their equivalents. *Johnston v. IVAC Corp.*, 885 F.2d 1574, 1580, 12 USPQ2d 1382, 1386-87 (Fed.Cir.1989). The '966 specification discloses use of a generic gradient wave form. Although it states that other wave forms may be used, it fails to specifically identify those wave forms. Thus, under section 112, ¶ 6, claim 12 is limited to use of a

generic gradient wave form and its equivalents.

We also conclude that the jury's finding that the accused machines contained the elements of the apparatus claim is supported by substantial evidence. Gafford testified that the accused devices infringed claim 12 because they performed the identical functions as specified, contained the same or equivalent structure, and performed the steps defined in the claim using the same or equivalent acts. He stated that in forming his opinion he relied upon the technical literature, specifications, and drawings of the accused GE machines. The jury could have reasonably relied upon his testimony in rendering its verdict that the accused machines met the limitations of the asserted claim, and contained equivalent structure or acts where necessary to meet the limitations subject to section 112, ¶ 6; its finding of infringement is thus supported by substantial evidence. See *Consolidated Edison Co. v. National Labor Relations Bd.*, 305 U.S. 197, 229, 59 S.Ct. 206, 216-17, 83 L.Ed. 126 (1938) (defining substantial evidence as "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion"). Accordingly, the district court did not err in denying GE's motion for JMOL concerning direct infringement of the asserted claims of the '966 patent.

#### C. Damages for Infringement of the '966 Patent

GE argues that the jury's findings concerning damages were not supported by substantial evidence. It argues that reasonable royalty damages were incorrectly based upon the sales of the entire MRI machines rather than the value of the improvement covered by the claimed invention, and that Fonar submitted no substantial evidence to show that the MAO feature was the basis for the customer demand for the entire machine. It argues that the effective royalty rate awarded has no support in the record and that the evidence indicated that GE entered into sixteen license agreements in which the royalty rate was significantly lower.

Fonar responds that GE incorrectly assumes that Fonar would have licensed the technology to a competitor for the same rate that it would have licensed a customer. Furthermore, Fonar argues that the entire market value rule entitles it to a royalty based upon the value of the entire MRI machine even when the patented feature was only a part of it, and that testimony by Fonar's witnesses supported an even higher royalty than that awarded by the jury.

The patent statute provides that

Upon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court.

35 U.S.C. § 284 (1994).

[9,10] Under the entire market value rule, it was not improper for the jury to base a reasonable royalty on the value of the entire accused MRI machines. That rule "allows for the recovery of damages based on the value of an entire apparatus containing several features, even though only one feature is patented." *Paper Converting Mach. Co. v. Magna-Graphics Corp.*, 745 F.2d 11, 22, 223 USPQ 591, 599 (Fed.Cir.1984). This is permitted when the patented feature is the basis for customer demand for the entire machine. *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1549, 35 USPQ2d 1065, 1073 (Fed. Cir.) (in banc), cert. denied, — U.S. —, 116 S.Ct. 184, 133 L.Ed.2d 122 (1995). There was evidence from which the jury could have concluded that was the case here. GE's own technical literature of record emphasized the MAO feature. A brochure for GE's Signa machine highlighted MAO in 1987, stating that "[m]ulti-slice, multi-angle capabilities offer direct acquisition of multiple view angles in one acquisition." Several other brochures of GE machines also identified the MAO feature. One GE brochure, entitled "Multi-angle MR imaging," states that: "A recent advance at GE Medical Systems, however, is helping to enhance efficiency and patient

throughput. Multi-angle imaging, featured on all Signa® systems, allows a single scan to be graphically prescribed with each slice—or group of slices—acquired at a different angle.” There was thus substantial evidence to support an award of a reasonable royalty based upon the cost of the entire accused machines.

[11] We agree with Fonar that the jury’s award of reasonable royalty damages was also supported by substantial evidence. Dr. Laurits Christensen, an expert witness for Fonar, testified that one-quarter to one-third of the anticipated profits on the sale of the infringing machines would have constituted a reasonable royalty and that this estimate would have resulted in a royalty of 7.25 percent, or \$54 million, for the 525 accused machines. This was higher than the royalty of \$34.125 million awarded by the jury. Also, GE had itself entered into a license agreement for MRI technology at a rate of seven percent.

GE argues that the lost profits award on all of its sales incorrectly assumed that Fonar would have made sales in markets in which Fonar did not compete with GE. GE argues that Fonar failed to adequately prove that there was a lack of noninfringing substitutes. Fonar responds that there were no noninfringing substitutes, that purchasers were motivated to buy the machines because of the MAO feature and that the alleged substitutes lacked that feature. Fonar also asserts that it had the capacity to manufacture and sell the machines whose sales it lost to GE.

[12, 13] In order to be entitled to lost profits, a patentee must show a reasonable probability that it would have made the sales “but for” the infringement. *Rite-Hite*, 56 F.3d at 1545, 35 USPQ2d at 1069. This may be done by means of the four-factor *Panduit* test, requiring proof of demand for the patented product, lack of acceptable noninfringing substitutes, capacity by the patentee to meet the demand, and the amount of profit patentee would have made. See *Panduit*

*Corp. v. Stahl Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1156, 197 USPQ 726, 729–30 (6th Cir. 1978). “The burden then shifts to the infringer to show that the inference is unreasonable for some or all of the lost sales.” *Rite-Hite*, 56 F.3d at 1545, 35 USPQ2d at 1069.

We agree with Fonar that the jury’s award of lost profits was supported by substantial evidence. Dr. Damadian testified that there was no acceptable alternative to MAO imaging. He testified that the available alternatives would have led to a significant compromise in speed and quality in comparison to using MAO. One alternative, according to Dr. Damadian, would have been 3D imaging. He testified, however, that in using 3D imaging, the amount of time required to collect the data would have resulted in a prohibitively long time for a patient to remain in a scanner. Other techniques referred to as “fast imaging techniques such as fast spin echo or echo plane” would have involved obtaining single scanned “slices” at a high speed and converting them into an assembly of multiple angles; however, Dr. Damadian testified that these techniques would have resulted in an unacceptable image quality. In addition to this evidence that no acceptable alternative to MAO imaging existed, Dr. Christensen testified that all competing machines with the MAO capability infringed the ’966 patent.

There was also substantial evidence that Fonar had the capacity to manufacture machines whose sales it lost. Through the testimony of Dr. Damadian, Fonar proved that in 1988 it could manufacture eight machines per month. He testified that in 1989, Fonar had 600–650 employees and a fast growth rate, having appeared for two consecutive years on Inc. magazine’s list of the fastest growing companies. Based on Fonar’s growth rate, Dr. Damadian testified that Fonar’s capacity would have increased to 500 machines per year by 1992. Accordingly, the district court did not err in denying GE’s motion for JMOL concerning damages for direct infringement of the ’966 patent.

#### D. Lapse of the ’966 Patent

GE argues that both the royalty and the lost profits awards must be vacated because

In the event of failure so to mark, no damages shall be recovered by the patentee in any action for infringement, except on proof that the infringer was notified of the infringement and continued to infringe thereafter, in which event damages may be recovered only for infringement occurring after such notice.

35 U.S.C. § 287(a) (1994).

[15-17] GE is correct. The machines in question were not marked, so that no damages were recoverable before notice was given. Moreover, servicing of the machines was analogous to repair, see *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 346, 81 S.Ct. 599, 604-05, 5 L.Ed.2d 592, 128 USPQ 354, 359 (1961), and repair is not infringement. If a machine was sold under circumstances that did not subject its seller to damages, then subsequent repair cannot subject it to damages. One is entitled to repair that which is sold free of liability for infringement. Therefore, the district court did not err in granting GE's motion for JMOL that it did not induce infringement of the '966 patent.

#### F. Direct Infringement of the '832 Patent

Fonar argues that it presented substantial evidence of GE's infringement of the '832 patent under the doctrine of equivalents and that the district court therefore erred in granting a motion for JMOL that GE did not infringe that patent. GE responds that its accused machines do not perform the steps of asserted claim 1, either directly or equivalently.

[18, 19] A patent may be infringed under the doctrine of equivalents by manufacture, use, or sale of subject matter equivalent to that literally claimed. Infringement under the doctrine "requires proof of insubstantial differences between the claimed and accused products or processes." *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1521-22, 35 USPQ2d 1641, 1648 (Fed.Cir. 1995), cert. granted, — U.S. —, 116 S.Ct. 1014, 134 L.Ed.2d 95 (1996). Infringement

under the doctrine is a question of fact, which we review for substantial evidence on appeal from a grant of a motion for a JMOL. *Id.* at 1522; 35 USPQ2d at 1648.

[20] We agree with Fonar that the jury's verdict finding infringement under the doctrine of equivalents was supported by substantial evidence. With respect to element (a) of claim 1, there was evidence showing existence of standard values for T1 and T2. In particular, GE scientists published an article in which they compiled reported values for T1 and T2. P.A. Bottomley et al., *A Review of 1H Nuclear Magnetic Resonance Relaxation in Pathology: Are T1 and T2 Diagnostic?*, Medical Physics, Jan./Feb.1987, at 1. This evidence provided a showing that GE's machines met step (a) of claim 1 at least equivalently by the insubstantial difference, if any, between standard values required by this limitation and GE's compiled values of T1 and T2.

There was also evidence presented that GE's machines performed an equivalent to step (b) of claim 1. GE's machines used a T1-weighted image and a T2-weighted image for detecting cancer. A T1-weighted image was a function of T1 and machine parameters; a T2-weighted image was a function of T2 and the machine parameters. There was testimony that the T1- and T2-weighted images were primarily controlled by T1 and T2 respectively. In particular, Dr. Damadian testified that a T1 image was controlled by the T1 relaxation time. Even Dr. Mezrich, GE's expert witness, agreed that T1- and T2-weighted images were images whose contrast was primarily determined by differences in T1 and T2. In its reference manual, GE stated that T1-weighted images "rely heavily on T1 relaxation information." This evidence provided a showing that GE's use of T1- and T2-weighted images were essentially controlled by the values of T1 and T2 and were thus an insubstantial difference from the use of T1 and T2 values as required by step (b) of claim 1.

Finally, there was evidence that GE's machines performed an equivalent to the com-

parison required by step (c) of claim 1. There was evidence that GE used its compiled standard values to produce precalibrated gray scale values. When GE's machines scanned suspect tissue in order to obtain a signal strength for a voxel, the volume element in the body corresponding to one pixel in the image, that signal strength was matched to a value within the precalibrated gray scale values. Thus, the assignment of a gray scale value for suspect tissue was determined in effect by a comparison of the tissue's signal strength with the standard values. This evidence provided a showing of insubstantial differences between this determination and the comparison required by step (c) of claim 1. Therefore, there was substantial evidence upon which the jury rendered its verdict finding that the accused machines infringed the asserted claims of the '832 patent under the doctrine of equivalents, and the district court erred in granting the motion for JMOL to the contrary.

#### COSTS

Each party shall bear its own costs.

#### CONCLUSION

The district court did not err in its judgment denying GE's motions for JMOL and sustaining the jury's verdict that (1) the '966 patent was not invalid for failure to satisfy the best mode requirement; (2) GE infringed the '966 patent and was liable for lost profits and reasonable royalty damages; and (3) GE was liable for infringement during a time period when the '966 patent lapsed for lack of a timely maintenance fee payment but was subsequently reinstated. It did not err in granting GE's motion for JMOL that it did not induce infringement of the '966 patent, but it did err in granting the motion for JMOL that GE did not infringe the '832 patent. Accordingly, we reverse the district court's judgment granting GE's motion for a JMOL that it did not infringe the '832 patent, and we reinstate the jury verdict finding infringement of that patent and awarding \$35 million in damages as compensation for that

infringement. We otherwise affirm the district court's judgment.

**AFFIRMED-IN-PART AND REVERSED-IN-PART.**



**CAMPBELL SOUP COMPANY,  
INC., Plaintiff-Appellant,**

**v.**

**The UNITED STATES, Defendant-  
Appellee.**

**No. 94-1435.**

**United States Court of Appeals,  
Federal Circuit.**

**March 3, 1997.**

Importer brought action challenging appraisal of its merchandise by United States Customs Service. The United States Court of International Trade, Gregory W. Carman, Chief Judge, 853 F.Supp. 1443, granted summary judgment in favor of government. Importer appealed. The Court of Appeals, Archer, Chief Judge, held that: (1) Customs Service was required to exclude rebates of internal Mexican taxes directly applicable to materials from cost or value of materials in determining computed value of imported merchandise, and (2) freight costs within country of exportation were properly included within merchandise's dutiable value.

**Affirmed in part and reversed in part.**

Pauline Newman, Circuit Judge, concurred in part and dissented in part with opinion.

NORTHERN TELECOM, INC.,  
Plaintiff-Appellant,

v.

DATAPOINT CORPORATION,  
Defendant/Cross-Appellant.

Nos. 89-1034, 89-1035.

United States Court of Appeals,  
Federal Circuit.

June 29, 1990.

Suggestion for Rehearing In Banc  
Declined Aug. 27, 1990.

On appeal and cross appeal of decision of the United States District Court for the Northern District of Texas, Sidney A. Fitzwater, J., in suit for infringement of patent for programmable processor-based batch data entry terminal, the Court of Appeals held that: (1) certain claims were not proved invalid for obviousness; (2) "AESOP-B" documents were not "printed publications" and certain claims were thus not anticipated by those documents; (3) finding that patent applicant intended to mislead or deceive Patent and Trademark Office with respect to certain amendments was clearly erroneous, and patent applicant also did not commit inequitable conduct by failing to disclose prior art that was not prior art to patent examiner; and (4) while certain claims were properly held invalid on basis that patent applicant concealed best mode of carrying out invention of those claims, other claims should not have been held invalid for lack of enablement, and findings of infringement were not clearly erroneous.

Affirmed in part, reversed in part, and remanded.

Pauline Newman, Circuit Judge, concurred in part and dissented in part and filed opinion.

#### 1. Patents $\Rightarrow$ 16(2)

It is insufficient that prior art disclosed components of patented device, either separately or used in other combinations; there must be some teaching, suggestion, or incentive to make combination made by inventor. 35 U.S.C.A. § 103.

#### 2. Patents $\Rightarrow$ 16.29

In suit for infringement of patent for programmable processor-based batch data entry terminal, claim for method of implementing source data entry terminal device, and pendent claims, were not proved invalid for obviousness. 35 U.S.C.A. § 103.

#### 3. Patents $\Rightarrow$ 16.29

Defendant in suit for infringement of patent on programmable processor-based batch data entry terminal did not by clear and convincing evidence establish facts regarding conclusion that subject matter of claims that were dependent on, inter alia, claim for method of source data capture would have been obvious and were thus invalid. 35 U.S.C.A. § 103.

#### 4. Patents $\Rightarrow$ 68

To serve as "printed publication," document must be generally available. 35 U.S.C.A. § 102(b).

See publication Words and Phrases for other judicial constructions and definitions.

#### 5. Patents $\Rightarrow$ 68

"AESOP-B" documents, reporting aspects of complex military system for on-line distributed computer processing of logistical data such as positions of aircraft, were not printed publications as claimed by defendant in suit for infringement of patent on programmable processor-based batch data entry terminal. 35 U.S.C.A. § 102(b).

#### 6. Patents $\Rightarrow$ 324.54

On appellate review of whether inequitable conduct has occurred in patent proceedings, court applies abuse of discretion standard abuse of discretion may obtain when ruling reflects erroneous application or interpretation of law, shows clear error of judgment, or is based on clearly erroneous factual findings.

#### 7. Patents $\Rightarrow$ 97

Although lapse on part of examiner does not exculpate patent applicant whose acts are intentionally deceptive, any doubt as to whether examiner lapsed in his duty does not increase burden on applicant, nor does applicant's obligation of candor replace examiner's duty to examine claims.



Practice Rules in Patent Cases, § 1.312, 35 U.S.C.A.App.

#### 8. Patents ⇐97

Intent to deceive should be determined in light of realities of patent practice, not as matter of strict liability, whatever the nature of action before Patent and Trademark Office.

#### 9. Patents ⇐312(6)

Finding that attorney for patent applicant intended to mislead or deceive Patent and Trademark Office when he filed amendment to descriptive text of patent application was clearly erroneous; thus, patent should not have been held unenforceable on ground of inequitable conduct. Practice Rules in Patent Cases, § 1.312, 35 U.S.C.A.App.

#### 10. Patents ⇐97

Patent applicant did not commit inequitable conduct by failing to disclose device to patent examiner, as that device was not prior art and thus was not material to patentability. Practice Rules in Patent Cases, § 1.56(a), 35 U.S.C.A.App.

#### 11. Patents ⇐324.55(2)

Compliance with best mode requirement is question of fact and is reviewed for clear error. 35 U.S.C.A. § 112.

#### 12. Patents ⇐99

District court's determination that claims of patent for programmable processor-based batch data entry terminal were invalid on basis of patent applicant's concealment of best mode of carrying out invention of those claims was not clearly erroneous. 35 U.S.C.A. § 112.

#### 13. Patents ⇐99

Decision on issue of enablement requires determination of whether person skilled in pertinent art, using knowledge available to such a person and disclosure in patent document, could make and use invention without undue experimentation; it is not fatal if some experimentation is needed, for patent document is not intended to be production specification. 35 U.S.C.A. § 112.

#### 14. Patents ⇐99

When challenged subject matter is computer program that implements claimed device or method, enablement is determined from viewpoint of skilled programmer using knowledge and skill with which such a person is charged; amount of disclosure that will enable practice of invention that utilizes computer program may vary according to nature of invention, role of program in carrying it out, and complexity of contemplated programming, all from viewpoint of skilled programmer. 35 U.S.C.A. § 112.

#### 15. Patents ⇐312(6)

District court's finding that patent specification did not contain enabling disclosure of software program used to carry out claimed invention in that its lack of information concerning invention's programs would require person reasonably skilled in art of computer programming to experiment unduly in attempting to write programs for device was clearly erroneous; thus, claims should not have been held invalid for lack of enablement. 35 U.S.C.A. § 112.

#### 16. Patents ⇐292.3(2)

In patent infringement action, district court could bar alleged infringer from introducing evidence to rebut testimony of patent holder's witness with respect to term "fixed program" — to wit, excerpts from its source codes; alleged infringer had refused patent holder's discovery request for those codes, did not produce them despite order to compel production, and did not object to testimony as surprise when it was given or for four months thereafter or offer information during that period to produce previously withheld information.

#### 17. Patents ⇐312(1)

District court did not shift to alleged patent infringer the burden of proving non-infringement by preponderance of the evidence by directing its attention to alleged infringer's defenses. 35 U.S.C.A. § 271.

#### 18. Patents ⇐239

Addition of features does not avoid patent infringement, if all elements of patent claims have been adopted, nor is in-

fringement avoided if claimed feature performs not only as shown in patent but also performs additional function. 35 U.S.C.A. § 271.

#### 19. Patents ⇐228

District court's finding of infringement of certain claims in patent for programmable processor-based batch data entry terminal was not clearly erroneous. 35 U.S.C.A. § 271.

#### 20. Patents ⇐289(2)

Issue of laches is pertinent to assessment of damages in patent infringement action because it may affect period of recovery for infringement.

Donald R. Dunner, Finnegan, Henderson, Farabow, Garrett & Dunner, Washington, D.C., argued, for plaintiff-appellant. With him on the brief, was J. Michael Jakes. Also on the brief, were George W. Whitney, Henry Y.S. Tang and Richard S. Clark, Brumbaugh, Graves, Donohue & Raymond, New York City, of counsel.

Jerry R. Selinger, Baker, Mills & Glast, Dallas, Tex., argued, for defendant/cross-appellant. With him on the brief, were Andrew S. Viger and Martha E. Waters.

Before MARKEY,\* NEWMAN and ARCHER, Circuit Judges.

#### PER CURIAM.

Northern Telecom, Inc., successor-in-interest to Sycor, Inc. (together herein "Sycor"), appeals the decision of the United States District Court for the Northern District of Texas. *Northern Telecom, Inc. v. Datapoint Corp.*, No. CA3-82-1039-D, 1988 WL 156280 (N.D.Tex. Aug. 31, 1988). Datapoint Corporation has filed a cross-appeal. At issue are the validity and enforceability of United States Patent No. 3,760,375 ("the '375 patent"), and infringement by Datapoint.

\* Circuit Judge Markey vacated the position of Chief Judge on June 27, 1990.

1. "Off-line" means not actively connected to the computer, in contrast to "on-line", wherein the

We affirm the district court's holding that certain claims had not been proved invalid under 35 U.S.C. §§ 102 and 103, that certain claims are infringed, and that certain claims are invalid for failure to comply with the best mode requirement of 35 U.S.C. § 112. We reverse the district court's holdings of invalidity for failure to comply with the enablement requirement of 35 U.S.C. § 112. We reverse the equitable determination of unenforceability based on inequitable conduct.

#### *The Invention*

The '375 patent, entitled "Source Data Entry Terminal", inventors Samuel N. Irwin and Michael R. Levine, relates to a mode of "batch processing" of data. In batch processing, data are entered by the operator and stored, off-line,<sup>1</sup> the operator not interacting with the computer but simply with the batch data entry device.

Batch data preparation and entry were not new. Systems in common use at the time this invention was made included the IBM punch card, the paper tape punch, and the key-to-magnetic tape recorder. The invention of the '375 patent, a programmable processor-based batch data entry terminal, provided an improved way of entering, verifying, and storing data. Entry and verification of data at the source by persons who understand the data removes a source of error in data processing. The inventors built a major business on the invention of the '375 patent.

In accordance with the '375 invention, the data are keyed into a form that is displayed on the screen; the operator is guided by names and instructions on the screen; and certain entries are subject to automatic as well as visual checks and edits. A storage area, or buffer, holds the data as it is entered and, when the buffer holds a complete and correct record, the data are transferred to a magnetic tape cassette.

terminal is connected by a communication link so that signals are transmitted directly between the terminal and the computer.

Sycor filed suit charging Datapoint with infringement of the '375 patent. Datapoint raised numerous defenses and counterclaims. The cause was vigorously litigated, the trial taking seventy days over a six-month period. The district court issued extensive findings of fact and conclusions of law, in a 219 page opinion. Each side appeals certain of the issues that were decided adversely to it.

I

*Obviousness—35 U.S.C. § 103*

Datapoint appeals the district court's determination that Datapoint did not prove by clear and convincing evidence facts requiring a holding that claims 35-37, 40-42, and 44 are invalid under § 103. Datapoint also raises the issue of invalidity under § 103 of claims 19, 20, and 25-28.

Datapoint relies as prior art on the Lincoln Laboratory Instrument Computer (LINC), developed in 1962 by expert witness Professor Clark, running the Patient Interview program, written by a Dr. Slack. The LINC is described as a stored program computer designed for laboratory use, consisting of a keyboard for data entry and commands to the computer, an electronics cabinet, an oscilloscope information display, and reel-to-reel digital magnetic tape units for storing data and programs.

*Claims 40-42 and 44*

[1, 2] Claim 40 is as follows:

40. A method of implementing a source data entry terminal device, comprising the steps:

connecting selected input/output peripheral components including at least a keyboard data entry means and a visual data display means to a buffer memory and to a central processor organization, and using said buffer memory for temporary storage of data entered by said keyboard means;

incorporating control logic for all such peripheral components in the central processor and controlling each such component by the central processor, such that said peripheral components need have

substantially no local control logic of their own;

and dedicating the terminal to a given operational configuration by incorporating a fixed program in said central processor.

Claims 41, 42, and 44 are dependent upon claim 40, and contain additional limitations.

The district court found that the final step of claim 40, requiring a fixed program, differed from the LINC because the LINC did not employ a fixed program. Datapoint contends on this appeal, as it did at trial, that this difference is a "routine design choice".

Sycor does not dispute that fixed programs are not new: inventor Irwin, in his testimony, gave the example of a calculator. Sycor describes the invention of the '375 patent as a new combination of known steps and elements, that provides a new and commercially successful solution to the problems of batch data entry. Sycor states that this combination was not taught or suggested by the prior art, including the LINC and the LINC as modified by the Patient Interview program.

It is insufficient that the prior art disclosed the components of the patented device, either separately or used in other combinations; there must be some teaching, suggestion, or incentive to make the combination made by the inventor. *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143, 227 USPQ 543, 551 (Fed.Cir.1985) (insufficient to select from the prior art the separate components of the inventor's combination, using the blueprint supplied by the inventor); *Rosemount, Inc. v. Beckman Instruments, Inc.*, 727 F.2d 1540, 1546, 221 USPQ 1, 7 (Fed.Cir.1984) ("As this court has held, 'a combination may be patentable whether it be composed of elements all new, partly new or all old'") (citations omitted); *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1551, 220 USPQ 303, 312 (Fed.Cir.1983), *cert. denied*, 469 U.S. 851, 105 S.Ct. 172, 83 L.Ed.2d 107 (1984) (individual references can not be "employed as a mosaic to recreate a facsimile of the claimed invention.") The district court found that the technolo-

gy for the invention claimed in the '375 patent existed at the time the invention was made, but correctly declined to engage in hindsight reconstruction of the claimed invention.

Datapoint argues that the differences between the LINC and the '375 invention are "trivial". The district court observed that the prior art failed to teach the combination and its use as set forth in the '375 patent, and stated that the invention's "commercial success, although not determinative of the issue, is some indication that the '375 patent was not [sic: invention would not have been] obvious", the court referring to *Graham v. John Deere Co.*, 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545, 148 USPQ 459 (1966).

The prior art does not suggest the Irwin/Levine solution of the '375 invention to the batch data entry problem. As discussed in *In re Rothermel*, 276 F.2d 393, 397, 125 USPQ 328, 332, 47 CCPA 866 (1960), the nature of the problem "which persisted in the art", and the inventor's solution, are factors to be considered in determining whether the invention would have been obvious to a person of ordinary skill in that art. See also, e.g., *Fromson v. Advance Offset Plate, Inc.*, 755 F.2d 1549, 1556, 225 USPQ 26, 31 (Fed.Cir.1985) (the prior art must suggest to one of ordinary skill in the art the desirability of the claimed combination). Whether the changes from the prior art are "minor", as Datapoint argues, the changes must be evaluated in terms of the whole invention, including whether the prior art provides any teaching or suggestion to one of ordinary skill in the art to make the changes that would produce the patentee's method and device. *Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick Co.*, 730 F.2d 1452, 1462, 221 USPQ 481, 488 (Fed.Cir.1984).

We affirm the district court's holding that claims 40-42 and 44 had not been proved invalid on the grounds raised.

#### Claims 35-37

[3] Claims 35-37 are dependent on claims 29 and 30, and include their limitations, as follows:

29. A method of source data capture, comprising the steps:

generating coded signals representative of alpha-numeric source data desired to be captured;

visually displaying the data of which said signals are representative by use of such signals;

using a buffer memory to temporarily store the data being displayed;

and recording the data on magnetic tape after the data has been visually displayed.

30. The method of claim 29, including the step of using a program format to generate said data-representative signals in a predetermined relative sequence, and visually displaying said data in such sequence.

35. The method of claim 30, wherein said format is used by recording it on magnetic tape and reproducing the record format prior to actual use.

36. The method of claim 35, wherein said format is recorded on magnetic tape enclosed within cassette tape cartridges, of the basic type conventionally used for audio recording.

37. The method of claim 35, wherein the format recorded on said tape is loaded into a buffer memory by replaying the tape, and the format is held in such buffer during data entry.

Datapoint asserts that claims 35-37 do not differ from the LINC with the Patient Interview program, except in trivial detail. The district court analyzed these differences. As to claim 35, the court found: "The evidence is insufficient in addressing whether the program format of the [Patient Interview] program was held in a buffer memory. The court would have to draw unwarranted inferences from the evidence to conclude otherwise."

While invalidity is a question of law, the party asserting invalidity must by clear and convincing evidence establish facts supporting a conclusion of invalidity, and asserted inferences of fact must similarly be supported to meet this standard. Datapoint has not shown that the district court

clearly erred in refusing to draw such inferences.

As to claim 36, Datapoint argues that Sycor's choice of cassette tapes to record data as opposed to the reel-to-reel system used in the LINC was "an obvious design choice." Sycor states that the use of cassette tapes in the '375 invention was a significant aspect of the '375 invention as a whole, and there was extensive evidence supporting this position. Datapoint does not show that the prior art suggests the Sycor combination. *Rosemount*, 727 F.2d at 1546, 221 USPQ at 7.

Datapoint has not by clear and convincing evidence established facts requiring the conclusion that the subject matter of claims 35-37 would have been obvious in terms of § 103. The holding of the district court in respect of claims 35-37 is affirmed.

#### *Claims 19, 20, 25-28*

The parties dispute whether Datapoint adequately raised the issue of the validity of claims 19, 20, and 25-28, based on the LINC as prior art. In view of our holding that these claims are invalid on other grounds, see Part V, *infra*, we do not consider this issue.

## II

#### *Anticipation—35 U.S.C. § 102(b)*

[4, 5] Datapoint challenges the district court's finding that claims 40-42 and 44 were not anticipated by certain "AESOP-B" documents because these documents were not "printed publications" in terms of 35 U.S.C. § 102(b)<sup>2</sup>. Whether a document is a "printed publication" is "a legal determination based on underlying fact issues". *In re Hall*, 781 F.2d 897, 899, 228 USPQ 453, 455 (Fed.Cir.1986).

The AESOP-B was a complex military system for on-line distributed computer processing of logistical data such as the positions of aircraft. The documents in question are four reports on aspects of this

system, identified as exhibits DX-2 through DX-5. The reports DX-2 through DX-5 were not under security classification, and were distributed to approximately fifty persons or organizations involved in the AESOP-B project. Document DX-5 contained the legend "Reproduction or further dissemination is not authorized ... not for public release." The district court found that documents DX-2 through DX-4 "may have" contained such notices, the court finding that they "were of the class of documents that would have been distributed with such a notice." The documents were housed in a library at the Mitre Corporation, the company having principal responsibility for developing AESOP-B. Access to the library was restricted to persons authorized by Mitre.

A document, to serve as a "printed publication", must be generally available. *Garrett Corp. v. United States*, 422 F.2d 874, 878, 164 USPQ 521, 524, 190 Ct.Cl. 858 (1970) ("While distribution to government agencies and personnel alone may not constitute publication ... distribution to commercial companies without restriction on use clearly does.") See *Massachusetts Institute of Technology v. AB Fortia*, 774 F.2d 1104, 1109, 227 USPQ 428, 432 (Fed. Cir.1985) (paper orally presented at a scientific meeting open to all persons interested in the subject matter, with written copies distributed without restriction to all who requested it, is a printed publication); *In re Wyer*, 655 F.2d 221, 226-27, 210 USPQ 790, 795 (CCPA 1981) (foreign patent applications that are made known to and are available to the public without restriction are publications).

The district court, referring to "the uncertainties of public access to the AESOP-B documents", found that Datapoint had failed to prove by clear and convincing evidence facts requiring a conclusion that these documents were "sufficient as prior publications, descriptive of the AESOP-B". The district court was unable to find that

2. 35 U.S.C. § 102: A person shall be entitled to a patent unless
  - (b) the invention was patented or described in a printed publication ... more than one year

prior to the date of the application for patent in the United States.

anyone could have had access to the documents by the exercise of reasonable diligence. See *Massachusetts Inst., supra*. We are unpersuaded that the evidence shows otherwise. Accordingly, we affirm that these documents were not printed publications.

Because the documents were not as a matter of law printed publications, we do not reach the issue of whether the AE-SOP-B system disclosed all the limitations of claim 29, on which claims 35-37 depend.

The district court's holding that claims 40-42 and 44 were not shown to be invalid under § 102(b) is affirmed.

### III

#### *Inequitable Conduct—The Rule 312 Amendment*

[6] The district court held all the claims of the '375 patent unenforceable based on inequitable conduct before the Patent and Trademark Office ("PTO"). On appellate review we apply the abuse of discretion standard. *Kingsdown Medical Consultants, Ltd. v. Hollister, Inc.*, 863 F.2d 867, 876, 9 USPQ2d 1384, 1392 (Fed.Cir.1988) (*in banc* clarification of precedent). Abuse of discretion may obtain when the ruling reflects an erroneous application or interpretation of law, or shows a clear error of judgment, or is based on clearly erroneous factual findings. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1245-46, 9 USPQ2d 1913, 1928 (Fed.Cir.1989); *Seattle Box Co. v. Industrial Crating & Packing, Inc.*, 756 F.2d 1574, 1581, 225 USPQ 357, 363 (Fed.Cir.1985).

#### A

The basis for the district court's ruling of inequitable conduct was the filing of an "Amendment Under Rule 312" during prosecution of the patent application that led to the '375 patent.

During prosecution the examiner had objected to the application on various grounds, but eventually allowed the claims substantially as filed. After the PTO issued the notice of allowance, but before payment of the issue fee, Sycor requested

amendment of the descriptive text of the patent application as authorized by PTO Rule 312, 37 C.F.R. § 1.312 (1969), which provided as follows:

§ 1.312. Amendments after the notice of allowance of an application will not be permitted as a matter of right. However, such amendments may be made if filed not later than the date the issue fee is paid, on the recommendation of the primary examiner, approved by the Commissioner, without withdrawing the case from issue.

Sycor filed a four-page amendment under Rule 312, containing twenty-five specific changes to the specification. In explanation Sycor's patent attorney wrote:

The present amendment under Rule 312 is primarily for the purpose of correcting certain typographical errors and other such discrepancies noted in the specification upon a final review of the same, immediately prior to payment of the issue fee.

The errors and discrepancies sought to be corrected by this amendment were not noticed previously, and thus could not have been corrected before the present time; because the corrections merely add to the clarity and readability of the specifications [sic], entry of the amendment is believed to be in order and is solicited.

The district court held that five of the requested changes altered the scope of the original disclosure and the scope of the previously allowed claims. These five changes, as listed by the district court with the changes to the text underlined, were as follows:

- (1) a wired *or like* read-only memory;
- (2) read-only memory containing a hard-wired *or otherwise fixed* program;
- (3) a hardwired *or fixed* program;
- (4) a wired *or like* ROM *of the form just mentioned* is unalterable;
- (5) the wired-in (*or otherwise fixed*) program in the ROM.

The examiner had written "Entry Recommended" in the margin of the Rule 312 amendment, alongside the first two changes listed above. On the official PTO

form the box was checked "entered as directed to matters of form not affecting the scope of the invention."

The district court found that the attorney intentionally misrepresented the purpose and nature of these amendments, and that this misrepresentation was material to patentability.

#### B

[7-9] Sycor argues that the amendments simply conformed the descriptive text of the specification to the claims, as required by the rules of PTO practice, and thus could not, as a matter of law, broaden the disclosure and the scope of the claims. Sycor states that such concordance is routine, and indeed can be compelled by the examiner. Sycor argues that neither intent to deceive nor materiality has been shown, and that the examiner correctly entered the amendments.

The original claims as filed are part of the patent specification. 35 U.S.C. § 112, ¶ 2; *In re Benno*, 768 F.2d 1340, 1346, 226 USPQ 683, 686-87 (Fed.Cir.1985). At the time the Rule 312 amendment was filed the claims had already been examined and allowed substantially as filed, and the subject matter added to the descriptive text by amendment was already in the allowed claims. The Manual of Patent Examining Procedure ("MPEP") § 608.01(1) (3d ed., rev. June 1968) states:

§ 608.01(1) In establishing a disclosure, applicant may rely not only on the description and drawing as filed but also on the original claims if their content justifies it.

Where subject matter not shown in the drawing or described in the description is claimed in the case as filed, and such original claim itself constitutes a clear disclosure of this subject matter, then the claim should be treated on its merits, and *requirements made to amend* the drawing and description to show this subject matter. [emphasis added]

Although Datapoint's witnesses testified that the changes enlarged the scope of the claims, the claims as originally filed and as allowed were already of the challenged

scope, and were already part of the disclosure. *Benno, supra*. See *Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 699, 218 USPQ 865, 871 (Fed.Cir.1983), *cert. denied*, 464 U.S. 1043, 104 S.Ct. 709, 79 L.Ed.2d 173 (1984) (the scope of the patent is determined by the claims).

The district court described the MPEP as requiring a "heightened showing" for entry of Rule 312 amendments which affect the disclosure, citing MPEP § 714.16, which states:

§ 714.16. As to amendments affecting the disclosure, the scope of any claim, or that add a claim, the remarks accompanying the amendment must fully and clearly state the reasons on which reliance is placed to show: (1) why the amendment is needed; (2) why the proposed amended or new claims require no additional research or examination; (3) why the claims are patentable and, (4) why they were not earlier presented.

The district court held that Sycor did not make the requisite statement of "reasons". The issue, however, is intent to deceive or mislead.

These amendments were not to the claims. The nature of these amendments was clear on their face, and the examiner was required to review them to determine whether they complied with law and practice. All the pertinent information was squarely before the examiner in a simple document. As stated in *Akzo N.V. v. United States Int'l Trade Comm'n*, 808 F.2d 1471, 1482, 1 USPQ2d 1241, 1247 (Fed.Cir. 1986), *cert. denied*, 482 U.S. 909, 107 S.Ct. 2490, 96 L.Ed.2d 382 (1987), "the examiner was free to reach his own conclusion...."

Although lapse on the part of an examiner does not exculpate an applicant whose acts are intentionally deceptive, *Kangaroo U.S.A. v. Caldor, Inc.*, 778 F.2d 1571, 1576, 228 USPQ 32, 35 (Fed.Cir.1985), any doubt as to whether the examiner lapsed in his duty does not increase the burden on the applicant. Nor does the applicant's obligation of candor replace the examiner's duty to examine the claims. *Kingsdown*, 863 F.2d at 874 n. 8, 9 USPQ2d at 1390 n. 8.

Entry of a Rule 312 amendment requires both the recommendation of the primary examiner and approval by the Commissioner. 37 C.F.R. § 1.312, *supra*. The record shows that entry of these amendments was expressly approved. We do not think the attorney's words "typographical errors and other such discrepancies" in the introductory paragraphs of the amendment must be deemed to have diverted the examiner from mandatory review of the ensuing subject matter, in view particularly of the examiner's specific recommendation that the amendment be entered. It is presumed that public officials do their assigned jobs. *American Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1359, 220 USPQ 763, 770 (Fed.Cir.), *cert. denied*, 469 U.S. 821, 105 S.Ct. 95, 83 L.Ed.2d 41 (1984).

The subjective nature of the factual determination of intent to deceive, which is the predicate to a holding of inequitable conduct, invites litigation and indeed had led to seemingly inconsistent decisions in the Federal Circuit. The district court here did not have the benefit of our guidance in *Kingsdown*, in which we sat *in banc* for the purpose, *inter alia*, of clarifying certain of our precedents. As stated therein:

"Gross negligence" has been used as a label for various patterns of conduct.... We adopt the view that a finding that a particular conduct amounts to "gross negligence" does not of itself justify an inference of intent to deceive; the involved conduct, viewed in light of all the evidence, including evidence indicative of good faith, must indicate sufficient culpability to require a finding of intent to deceive. See *Norton v. Curtiss*, 433 F.2d 779, 167 USPQ 532 [57 CCPA 1384] (CCPA 1970).

863 F.2d at 876, 9 USPQ2d at 1392.

The district court held that Sycor's misrepresentation of the nature of the amendment sufficed to support a holding of inequitable conduct before the Patent and Trademark Office. The district court described the attorney's communication as "disingenuous." The court stated that the "case law makes clear that, although a party's underlying conduct may be accept-

able, that fact does not exculpate the party from an inequitable conduct finding [sic: holding] where the party misrepresented the nature of the underlying conduct to the PTO."

Intent to deceive should be determined in light of the realities of patent practice, and not as a matter of strict liability whatever the nature of the action before the PTO. *Accord Pfizer, Inc. v. International Rectifier Corp.*, 538 F.2d 180, 186, 190 USPQ 273, 278 (8th Cir.1976), *cert. denied*, 429 U.S. 1040, 97 S.Ct. 738, 50 L.Ed.2d 751 (1977). "A patentee's oversights are easily magnified out of proportion by one accused of infringement...." *Id.* 538 F.2d at 196, 190 USPQ at 286. Given the ease with which a relatively routine act of patent prosecution can be portrayed as intended to mislead or deceive, clear and convincing evidence of conduct sufficient to support an inference of culpable intent is required.

When all of the circumstances are considered, including indications of good faith, we are left with a definite and firm conviction that a mistake has been made regarding Sycor's state of mind when it filed its Rule 312 amendment in the Patent and Trademark Office. *Anderson v. City of Bessemer City, N.C.*, 470 U.S. 564, 105 S.Ct. 1504, 84 L.Ed.2d 518 (1985); *Kingsdown*, 863 F.2d at 876, 9 USPQ2d at 1392; *FMC Corp. v. Manitowoc Co.*, 835 F.2d 1411, 1416, 5 USPQ2d 1112, 1116 (Fed.Cir. 1987) (intent must be determined in view of all the circumstances). Here, there was no failure of compliance with 37 C.F.R. § 1.118(a), which states that:

§ 1.118(a) All amendments to the specification, including the claims, and the drawings filed after the filing date of the application must conform to at least one of them as it was at the time of the filing of the application.

Even if Sycor's statement in its covering letter to the examiner was in error or negligent, the Rule 312 amendment was made as of right, authorized by MPEP § 608.01(1). This right weighs against an inference of intent to deceive the examiner into entering the amendment.



Accordingly, we conclude that the district court's finding that Sycor intended to mislead or deceive the Patent and Trademark Office is clearly erroneous. Thus we need not reach the question of materiality, for absent the element of intent the court's holding of inequitable conduct was legal error, and thus exceeded the court's discretionary authority. The holding of unenforceability on this ground is reversed.

#### IV

##### *Inequitable Conduct—The Viatron 21 Device*

[10] Datapoint appeals the district court's ruling that Sycor did not commit inequitable conduct by not disclosing the Viatron 21 device to the patent examiner.

The patent applicant is required to advise the patent examiner of all information known to the applicant that "a reasonable examiner would consider important in deciding whether to allow the application to issue as a patent". 37 C.F.R. § 1.56(a) (1989). This requirement has grown in importance because of the highly technical nature of the subject matter of many patent applications, the difficulties inherent in searching the worldwide technical literature, and the unique knowledge that the applicant may hold.

According to Datapoint, the existence of the Viatron 21 device became known to inventor Irwin during the time that Irwin was working on the invention of the '375 patent, including knowledge that the Viatron 21 used a tape cassette, albeit in a different system for data processing.

The district court found that the Viatron 21 device was not available as prior art. Datapoint does not on appeal challenge that finding, but merely calls the Viatron 21 "prior art" in arguing that it should have been disclosed. Since the Viatron 21 device was not prior art, it was not material to patentability. *Environmental Designs*, 713 F.2d at 698, 218 USPQ at 870. Absent materiality, inequitable conduct for failure to disclose can not lie.

The district court's determination on this point is affirmed.

#### V

##### *Best Mode—35 U.S.C. § 112*

[11,12] The district court held that claims 19-20, 22, and 24-28 of the '375 patent are invalid on the basis that Sycor concealed the best mode of carrying out the invention of these claims. Compliance with the best mode requirement is a question of fact, and is reviewed for clear error. *DeGeorge v. Bernier*, 768 F.2d 1318, 1324, 226 USPQ 758, 763 (Fed.Cir.1985).

One of the objectives of the disclosed invention was to capture data "on magnetic tape cassettes of the general type presently finding extensive and widespread usage in audio entertainment equipment, but never heretofore used in data-handling apparatus." (Col. 1, lines 59-63.) The specification also stated that the invention includes cassettes "of the type which are almost universally available for audio purposes." (Col. 3, lines 32-33.) The district court, however, found that Sycor knew, in advance of filing the patent application, that standard audio tape was not the best mode for carrying out the invention. This finding is amply supported by the testimony of a former Sycor Vice-President-Engineering who was an employee of Sycor at the time the patent application was filed, and by other evidence, that Sycor purchased tape and cassettes of its own design and specifications and that these were different from standard audio tapes in their yield strength and magnetic characteristics.

Sycor argues that, at the time of the patent application, the 3M commercial audio tape that was on the market met its specifications. If so, it is this tape (or Sycor's own specifications) that had to be disclosed to satisfy the best mode requirement of 35 U.S.C. § 112, para. 1. While Sycor's argument may be relevant to enablement, it does not establish the best mode "contemplated by the inventor," which is a subjective inquiry. See *Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524, 3 USPQ2d 1737 (Fed.Cir.1987); see also *Dana Corp. v. IPC Ltd. Partner-*

ship, 860 F.2d 415, 8 USPQ2d 1692 (Fed. Cir.1988).

The district court's determination on this point is affirmed.

## VI

### *Enablement—35 U.S.C. § 112*

[13–15] Claims 1, 3, 5–7, 9–12, 14–20, 22, 29–33, 35–42, and 44 were held invalid for lack of enablement. The district court held that the patent specification did not contain an enabling disclosure of the software program used to carry out the claimed invention, stating that “the patent specification’s lack of any information concerning the invention’s programs would require a person reasonably skilled in the art of computer programming to experiment unduly in attempting to write programs for the ‘375 device.”

35 U.S.C. § 112 ¶ 1 provides that:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same....

Invalidity for lack of enablement is a conclusion of law and must be supported by facts proved by clear and convincing evidence, for the grant of the patent by the PTO carries with it the presumption of validity including compliance with § 112.

A decision on the issue of enablement requires determination of whether a person skilled in the pertinent art, using the knowledge available to such a person and the disclosure in the patent document, could make and use the invention without undue experimentation. It is not fatal if some experimentation is needed, for the patent document is not intended to be a production specification. *In re Gay*, 309 F.2d 769 at 774, 135 USPQ 311 at 316, 50 CCPA 725 (1962). See *Atlas Powder Co. v. E.I. Du Pont De Nemours & Co.*, 750 F.2d 1569, 1576, 224 USPQ 409, 413 (Fed.Cir. 1984) (discussing the amount of experimentation).

When the challenged subject matter is a computer program that implements a claimed device or method, enablement is determined from the viewpoint of a skilled programmer using the knowledge and skill with which such a person is charged. The amount of disclosure that will enable practice of an invention that utilizes a computer program may vary according to the nature of the invention, the role of the program in carrying it out, and the complexity of the contemplated programming, all from the viewpoint of the skilled programmer. See *In re Sherwood*, 613 F.2d 809, 817, 204 USPQ 537, 544 (CCPA 1980), *cert. denied*, 450 U.S. 994, 101 S.Ct. 1694, 68 L.Ed.2d 193 (1981). As the court observed in *Sherwood*, the writing of a program may require varying degrees of skill:

In general, writing a computer program may be a task requiring the most sublime of the inventive faculty or it may require only the droning use of clerical skill. The difference between the two extremes lies in the creation of mathematical methodology to bridge the gap between the information one starts with (“the input”) and the information that is desired (“the output”).

613 F.2d at 816–17, 204 USPQ at 544.

The claimed invention of the ‘375 patent is not in the details of the program writing, but in the apparatus and method whose patentability is based on the claimed combination of components or steps. Further, experts for both sides testified that an experienced programmer could, without unreasonable effort, write a program to carry out the invention of the ‘375 patent. The possible design of superior software, or whether each programmer would work out the details in the identical way, is not relevant in determining whether the inventor has complied with the enablement requirement.

Expert witnesses testifying for Data-point agreed that there were various ways of writing a program that would perform the ‘375 invention. Gordon Bell, Earle Pughe, and Fernando Corbato all testified that it would be relatively straightforward for a skilled computer programmer to de-

sign a program to carry out the claimed invention.

In Bell's deposition testimony, contrary to his testimony at trial, he averred:

Q. Would it have been obvious in June of '69 for someone of ordinary skill to write the program for a computer to operate as a source data entry terminal given the functions of the source data entry terminal?

A. Yes.

Earle Pughe testified:

Q. And could anybody have built—reasonably skilled in the art built a fixed-program read-only memory device with a source data entry program?

A. Yes, sir.

Fernando Corbato, another Datapoint expert, testified:

[T]here is a tremendous amount of lore and understanding that one must have in order to carry it out which depending on who you are dealing with may or may not be state of the art. To someone with a, a skilled computer designer, it would appear to be very, very straightforward to do anything that was described in the patent. He probably would have felt that he had already been doing that. The problem was I don't think the patent describes any novel configuration.

The district court referred in its opinion to the testimony of Kay Magleby that one skilled in the art of computer programming would be hindered because such a person could not tell where the program format would be loaded, what would be a typical program format, what characters would be used, or what would be the range or limitations of the format program. Sycor points out that the '375 patent specification states that the format program is stored in the delay line buffer memory. On cross-examination, Magleby acknowledged that the specification contains a description of how the format program is entered into the delay line buffer memory:

So here [in the '375 patent] I see a description of how, whatever this format

program is, is entered into the delay line and stored on cassette tape.

In another exchange with Magleby:

Q. Would one of ordinary skill have any difficulty in determining what the instruction format would be?

A. I think one of ordinary skill could develop a product that would satisfy the claims of the patent.

However, if there's something unique about this particular product as represented in the claims, then I think it should be explained clearly enough in the specification so that we can understand what's unique.

The format program is described in the specification as "character codes which are representative of and which initiate machine control functions." Datapoint's witness Professor Clark testified that additional information such as detailed flow charts, block diagrams, or source code listings were necessary in order to avoid spending experimental time. However, as noted in *Sherwood*, a description of such information may be adequate to a skilled programmer:

In assessing any computer-related invention, it must be remembered that the programming is done in a computer language. The computer language is not a conjuration of some black art, it is simply a highly structured language.... [T]he conversion of a complete thought (as expressed in English and mathematics, i.e. the known input, the desired output, the mathematical expressions needed and the methods of using those expressions) into a language a machine understands is necessarily a mere clerical function to a skilled programmer.

613 F.2d at 817 n. 6, 204 USPQ at 544 n. 6. Although there have been circumstances wherein production of the computer program was not routine, as in *White Consol. Indus., Inc. v. Vega Servo-Control, Inc.*, 713 F.2d 788, 791, 218 USPQ 961, 963 (Fed. Cir.1983), where the production of the program required one and one half to two person-years of work, such circumstances were not shown or suggested for the '375 invention.

The great weight of the expert testimony on both sides was that a programmer of reasonable skill could write a satisfactory program with ordinary effort. This requires the conclusion that the programs here involved were, to a skilled programmer, routine. The district court's finding that undue experimentation was necessary to write the program is clear error.

The holding that the claims are invalid for lack of enablement is reversed.

## VII

### *Infringement—35 U.S.C. § 271*

Datapoint challenges the district court's finding that claims 19, 20, 25-28, 35-37, 40-42, and 44 of the '375 patent are infringed.

#### *The Excluded Evidence*

[16] Datapoint argues that the district court erred in finding infringement of claims 40-42 and 44, in that the court unfairly barred Datapoint from introducing evidence to rebut the testimony of Sycor's witness Dr. Larky with respect to the term "fixed program".

Datapoint states that the definition of "fixed program" was presented in the '375 patent and in pre-trial discovery as a program that was "not easily changeable" by the data entry operator, and that Larky changed the definition during his testimony to a program that was "not self-modifying and which the operator could not alter." Datapoint states that the latter definition is correct, but that this was a substantial change, and a surprise at trial. To support its position of non-infringement based on this definition, Datapoint sought to introduce, at trial, excerpts from its source codes. Datapoint states that the surprise definition of a fixed program made the source codes relevant.

Sycor objected to this proffered evidence, on the ground that the source codes were requested during discovery, were refused by Datapoint and, despite an order to compel production, were never produced. Sycor states that Datapoint did not object to Larky's testimony as surprise when it was

given, or for four months thereafter, or offer during that period to produce this previously-withheld information. Indeed, the source codes were offered into evidence on the last day of Datapoint's testimony in chief.

On this history, we conclude that the district court did not abuse its discretion in refusing to receive this evidence. *United States v. Cohen*, 888 F.2d 770, 774 (11th Cir.1989) ("Absent an abuse of discretion, evidentiary rulings of the trial court will stand.") The court's trial management "should not be impeded by second guessing at the appellate level except in those rare instances when a clear abuse of discretion is firmly shown." *Rosemount*, 727 F.2d at 1549-50, 221 USPQ at 10 (upholding exclusion of expert testimony where expert not identified before trial despite court order).

We have carefully considered Datapoint's arguments and authorities, but Datapoint has not shown that the circumstances of this case show prejudicial error, or exceeded the trial court's discretionary authority. The exclusion of the source codes is not grounds for reversal or other remedial action.

#### *The Burden of Proof*

[17] Datapoint argues that the district court shifted to Datapoint the burden of proving non-infringement, rather than requiring Sycor to meet its burden of proving infringement by a preponderance of evidence. Datapoint contends that it adequately showed at trial that the accused programs were self-modifying (i.e., not "fixed") in that they used "overstoring," and thus that Sycor had not met its burden of proof.

Sycor had provided evidence, through the testimony of its expert witnesses, that each element or step of the claims was embodied in Datapoint's equipment and method. The court thus directed its attention to Datapoint's defenses, stating in its opinion:

The court recognizes that Sycor has the burden of proving by a preponderance of the evidence that Datapoint has infringed the '375 patent by Datapoint's hardware-software equipment combina-

tions. Nevertheless, Datapoint has purported seriously to challenge Sycor's expert testimony in six areas. The court has therefore determined to approach the infringement issues, not from the standpoint of Sycor's affirmative assertions, but from Datapoint's defensive assertions. Except to the extent the court finds non-infringement in its findings below, the court is satisfied that, were the patent valid and enforceable, Sycor's evidence is otherwise sufficient to prove infringement by a preponderance of the evidence.

This statement does not support Datapoint's position that the district court required Datapoint to prove non-infringement by a preponderance of evidence.

In its defense Datapoint had presented evidence that there are three types of overstorage: overlays, the DOS interrupt handler, and the NOP JUMP instruction. The district court's opinion discusses the technological details, which need not be repeated here. The district court found that although the accused Datapoint devices had the capability of overstorage, Datapoint did not show that this capability was used. The court found that Datapoint had not shown that such overlays must occur in the DOS, and the court found that any possible use of overlays was not adequately explained. The court also found that Datapoint's DATASHARE interpreters use overlays, but that the evidence presented did not show sufficiently clearly that the overlays must be used. The court further found that the NOP JUMP instruction could not be used in most of the accused programs. While Datapoint contends that these findings show that the burden of proof was shifted to it, Datapoint has not shown that the trial court wavered from correct application of the burdens.

The court found in favor of Datapoint that the DATABUS 15 interpreter 32K memory device was not a fixed program, and did not infringe. Sycor does not challenge this holding. However, Datapoint makes the argument that none of its products infringe because "Datapoint users have the option to program any Datapoint DATASHARE or DATABUS system for at

least part of its hardware configuration". Datapoint refers to certain pages in its user manuals, one of which describes a "default configurator" that permits the user "to configure the run-time characteristics of his DATABUS interpreter," and another of which states that it "supports many configurations ... via configuration options".

Sycor responds that the term "operational configuration" of claim 40, understood in light of the '375 patent specification, means at least the peripheral configuration of the terminal, such as input, output, and recording devices. Sycor explains that the fixed program of the '375 patent provides control for a given combination of specific peripherals, i.e., the hardware configuration, and contains the definitions of various keys, defined through the execution of the ROM program to initiate the action of the peripheral devices.

These arguments were generally before the district court. Datapoint has not met its burden of showing that the district court clearly erred in its findings. The information in Datapoint's user manuals on possible hardware or peripheral configuration at the user's option may, as Datapoint states, show that additional functions may be performed, but does not show clear error in the district court's holding that infringement of these claims was established by a preponderance of the evidence.

#### *Claims 35-37*

[18,19] While the parties dispute whether Datapoint used the phrase "reverse doctrine of equivalents" at trial, we agree with Datapoint that the substance of the argument was raised. Datapoint argued that even if these claims appear to read literally on the Datapoint equipment, the products are changed in such substantial ways from that described in the '375 patent that infringement can not be found. See *SRI Int'l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1123, 227 USPQ 577, 587 (Fed.Cir.1985) (*in banc*) (discussing the reverse doctrine of equivalents).

Datapoint states that its accused products are general purpose computers, rather than a special purpose terminal using a replaceable, hard-wired ROM, as contemplated in the '375 patent. Datapoint argues, as it did at trial, that its products are capable of processing data as the data are entered, and therefore that its products are not source data entry terminals. Datapoint states that its devices are so changed that, despite a literal reading of the claims on these devices, infringement is avoided under the "reverse doctrine". The district court agreed that Datapoint's products have some features in common with general purpose computers, but held that these features did not defeat infringement.

The addition of features does not avoid infringement, if all the elements of the patent claims have been adopted. *Radio Steel & Mfg. Co. v. MTD Prods.*, 731 F.2d 840, 848, 221 USPQ 657, 663-64 (Fed.Cir.), cert. denied, 469 U.S. 831, 105 S.Ct. 119, 83 L.Ed.2d 62 (1984). Nor is infringement avoided if a claimed feature performs not only as shown in the patent, but also performs an additional function. *Id.* 731 F.2d at 848, 221 USPQ at 664. We have carefully considered Datapoint's argument that its hardware is "quite different" from that described in the '375 patent. We conclude that Datapoint has not shown clear error in the district court's finding of infringement by a preponderance of evidence.

Datapoint blames the success of Sycor's position as to infringement on the subject matter entered into the descriptive portion of the specification by the challenged Rule 312 amendment, see Part III *ante*. Sycor asserts that the district court did not adopt whatever enlarged claim interpretation Datapoint states Sycor intended to obtain through the Rule 312 amendment. Datapoint directs us to no apparent reliance by the district court on the descriptive text as modified under Rule 312.

Datapoint has shown no clear error in the district court's findings of infringement. The holding of infringement is affirmed.

## VIII

### Laches

[20] Datapoint asserts that the district court erred in not finding material prejudice due to Sycor's asserted period of inaction in enforcing the '375 patent. The district court did not decide the question of laches, stating: "That the court has found for Datapoint today precludes a finding of material prejudice." Because we have reversed the majority of the rulings in favor of Datapoint, the defense of laches may require resolution. The issue is pertinent to the assessment of damages because it may affect the period of recovery for infringement. See *Sun Studs, Inc. v. ATA Equip. Leasing, Inc.*, 872 F.2d 978, 11 USPQ 2d 1479, 1479 (Fed.Cir.1989) (remanding for determination of laches).

The merits of the issue were not argued on this appeal, both sides agreeing that remand to the district court would be appropriate. Thus during the damages phase the court may consider the question of laches if it is duly raised.

## IX

### Other Issues

We have considered all the additional issues and arguments raised in the appeal and the cross-appeal. None changes the views expressed and decisions reached herein.

### Costs

Taxable costs shall be assessed in favor of Northern Telecom.

### Summary

Claims 19-20, 22 and 24-28 are invalid for failure to disclose the best mode. Claims 35-37, 40-42, and 44 are not invalid, are enforceable, and are infringed.

The cause is remanded for further proceedings consistent herewith.

AFFIRMED IN PART, REVERSED IN PART, AND REMANDED.

PAULINE NEWMAN, Circuit Judge, concurring in part, dissenting in part.

I share the court's opinion as to Parts I through IV, and VI through IX. I respectfully dissent from the holding in Part V that certain claims are invalid for failure to comply with the "best mode" requirement of 35 U.S.C. § 112.

A holding of invalidity on this ground requires that the inventor knew of and concealed a better mode than was disclosed in the patent application. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384-85, 231 USPQ 81, 94 (Fed.Cir. 1986). It is facile, and erroneous, to infer that information not included in a patent application was necessarily concealed. Patent applications rarely contain every detail, for that is not their function, but infringers constantly seek to enlarge any omission into a fatal flaw. Challenge is easy; the penalty is extreme. Thus precedent requires that violation of the "best mode" provision be established by clear and convincing evidence. *Hybritech*, 802 F.2d at 1384, 231 USPQ at 94.

The fatal flaw with which Sycor was charged was the statement in the patent specification that standard audio tape cassettes were used to record the data, the district court holding that Sycor knew that standard audio tape was not the best mode. At the trial witnesses testified that commercial audio tape was used to record the data, that these tapes varied in quality, and that not all worked equally well. There was in evidence a document showing Sycor's specification of commercial tape parameters, including tests of tapes made by K/Tronics, TDK, 3M (Scotch brand), and ongoing tests of BASF tapes. The district court referred to Datapoint's contention that "Sycor knew at the time of filing the '375 patent application that this cassette specification was needed to practice the best mode", and held that "Sycor did not disclose the best mode". With respect to the 3M tape referred to by the panel majority, Sycor stated that the 3M tape met all of the parameters set out in its tape specification; while Datapoint argued that the 3M tape "apparently failed". The dis-

trict court did not identify the 3M tape, or any other, as the best mode.

On this record, there was not clear and convincing evidence of concealment of a better mode known to the inventor. Nor was there any finding of concealment. It was undisputed that the specification of commercial audio tape parameters was prepared by Sycor for distribution. Distribution is inimical to concealment.

To determine whether an asserted omission amounts to concealment, such omission should be considered in light of all the circumstances. For example, consideration should be given to whether the omitted information was publicly known or readily ascertainable; whether there was any benefit to the patentee of concealment—or the absence of benefit; the materiality of the information; whether the interested public was actually prejudiced; and any evidence tending to show good or bad faith. In this case, each of these factors weighs on the side of Sycor.

It was undisputed that persons of ordinary skill were aware of differences among commercial audio tapes. As was stated in *In re Karnofsky*, 390 F.2d 994, 997, 156 USPQ 682, 685, 55 CCPA 940 (1968):

Where one of ordinary skill in the art would know how to select operating conditions so as to achieve a particular result, the failure to include a recitation of some specific operating conditions in the specification cannot give rise to a rejection either under the "enabling" or under the "best mode" requirement of 35 U.S.C. § 112.

A patent document is not a "production specification". *In re Gay*, 309 F.2d 769, 772, 135 USPQ 311, 315, 50 CCPA 725 (1962); *Manual of Patent Examining Procedure* § 608.01(h) (8th ed. May 1988). It seems to me that the information on commercial audio tape parameters is not untypical of work that is done after an invention has been made, when development continues and data accumulate, often concurrently with patent application work. When the patent specification is fully enabling, the failure to include information that is not necessary either to describe or to enable

the claimed invention should not invalidate the claims under the "best mode" provision, unless the information was withheld for the purpose of concealment of a better mode.

I would reverse the trial court's holding as based on incorrect law, and the absence of clear and convincing evidence of failure to meet the "best mode" requirement.



Gary B. BISSON, Petitioner,

v.

OFFICE OF PERSONNEL  
MANAGEMENT,  
Respondent.

No. 89-3410.

United States Court of Appeals,  
Federal Circuit.

July 6, 1990.

Rehearing Denied Aug. 13, 1990.

Suggestion for Rehearing In Banc  
Declined Sept. 5, 1990.

Public employee sought judicial review of decision of Merit Systems Protection Board, 41 M.S.P.R. 341, (unpublished opinion), holding that employee was not entitled to civil service retirement credit for time when he was employed as private roll employee of Smithsonian Institution. The Court of Appeals, Allen Sharp, Chief Judge, sitting by designation, held that: (1) petition presented "actual controversy," even though employee had not yet retired, and (2) petitioner's employment as private roll employee was not creditable for civil service retirement purposes.

Affirmed.

\* Chief Judge Allen Sharp of the United States District Court for the Northern District of

# 1. United States ⇌39(15)

Petition for review of decision of Merit Systems Protection Board, holding that petitioner's employment as private roll employee was not creditable for civil service retirement purposes, presented "actual controversy" which Court of Appeals could address, notwithstanding that petitioner had not yet retired. U.S.C.A. Const. Art. 3, § 1 et seq.

See publication Words and Phrases for other judicial constructions and definitions.

# 2. United States ⇌39(15)

Public employee was not entitled to credit, for civil service retirement purposes, for time spent as private roll employee of Smithsonian Institution who was paid from Smithsonian Trust Funds rather than from federally appropriated funds. 5 U.S.C.A. § 8331 et seq.

# 3. Constitutional Law ⇌238.5

## United States ⇌39(15)

No equal protection problem arose from Civil Service Commission's correction of previous mistake by refusing to recognize trust fund employees as federal employees for civil service retirement purposes. U.S.C.A. Const. Amend. 14.

Gary B. Bisson, of the Agency for Intern. Development, Washington, D.C., argued pro se.

Paul David Langer, of the Dept. of Justice, Washington, D.C., argued for respondent. With him on the brief were Stuart M. Gerson, Asst. Atty. Gen., David M. Cohen, Director and Stephen J. McHale, Asst. Director. Of counsel were Jaime Ramon, Gen. Counsel, Thomas F. Moyer, Asst. Gen. Counsel, and Earl A. Sanders, Office of Gen. Counsel, Office of Personnel Management.

Before NIES, Chief Judge, and  
PLAGER, Circuit Judge, and SHARP,  
District Judge.\*

Indiana, sitting by designation.



knowledge of the dangerous circumstances although the manufacturer knew or should have known of the hazard.

From this testimony, we find that a jury could determine that the tire posed a non-obvious risk of serious injury when used in its intended manner. The jury also could conclude that Firestone was aware of this risk. From this, the jury would be authorized to find that Firestone had a duty to warn of the risk. At this juncture of the case it was error to direct a verdict in favor of the defendant.

The district court also cited Outlaw's failure to produce evidence on the content of an adequate warning. While a jury would be entitled to consider the content of a warning in deciding whether there was a duty to warn, we are aware of no Alabama case that places the burden on the plaintiff to produce this type of evidence in order to make out a prima facie case.

Because genuine issues of fact remain, the judgment of the district court granting a directed verdict in favor of Firestone is REVERSED and the case is REMANDED for a new trial.



**CABLE ELECTRIC PRODUCTS,  
INC., Appellant,**

**v.**

**GENMARK, INC., a/k/a Diablo  
Products Corp., Appellee.**

**Appeal No. 84-1412.**

**United States Court of Appeals,  
Federal Circuit.**

**Aug. 9, 1985.**

Night light manufacturer brought action alleging patent infringement and violation of the Lanham Act, and asserting state

claims for unfair competition, dilution, and trademark infringement. The United States District Court for the Northern District of California, William W. Schwarzer, J., granted summary judgment for defendant on the patent infringement count, 582 F.Supp. 93, and on the remaining counts, 586 F.Supp. 1505. Manufacturer appealed. The Court of Appeals, Bennett, Circuit Judge, held that: (1) patent No. 4,343,032, relating to photosensitive electric lamp able to turn itself on by degree as ambient light diminishes, is invalid for obviousness; (2) genuine issues of material fact existed as to functionality of the device in question, precluding summary judgment on federal claim for false designation of origin and on state claims for unfair competition, dilution, and trademark infringement; and (3) remand was required so that district court could apply local circuit law in determining proper reach of preemptive effect of federal patent laws in relation to state trade regulation laws.

Affirmed in part, vacated in part, and remanded.

#### 1. Patents $\S$ 323.2(5)

District court could not be faulted for failing to find particular facts in granting summary judgment, despite nonmovant's contention that district court did not adequately amplify its reasoning and underlying factual inferences on which it relied in granting summary judgment. Fed.Rules Civ.Proc.Rules 52(a), 56(c, d), 28 U.S.C.A.

#### 2. Patents $\S$ 323.2(5)

While determination on pertinency may in some cases afford insight into reasoning of fact finder, it is not strictly a requirement for proper obviousness analysis. 35 U.S.C.A.  $\S$  103.

#### 3. Patents $\S$ 324.55(4)

Obviousness under 35 U.S.C.A.  $\S$  103 is conclusion of law subject to Court of Appeals' full and independent review.

#### 4. Patents $\S$ 324.60

Reversal of district court's grant of summary judgment to defendant in patent

infringement suit would require more than mere demonstration of error in analysis; even assuming that such errors were committed, plaintiff was required to demonstrate that if the errors were corrected, application of law to the facts would produce different result.

**5. Patents ⇐323.2(4)**

Defendant who moved for summary judgment in patent infringement suit on basis of invalidity of the patent had burden of overcoming presumption of patent validity found in 35 U.S.C.A. § 282.

**6. Patents ⇐312(1½)**

In patent infringement suit in which validity of patent is contested, if evidence is presented establishing prima facie case of invalidity, opponent of invalidity must come forward with evidence to counter prima facie challenge to presumption of validity under 35 U.S.C.A. § 282; this requirement is in no way contrary to procedural role of presumption of validity, nor does it in substance shift burden of persuasion on the issue.

**7. Patents ⇐323.2(4)**

On defendant's motion for summary judgment in patent infringement suit, district court's statement that plaintiff sought to "avoid summary judgment" by introducing declaration of expert that, it claimed, raised genuine issues of material fact, did not shift to plaintiff the burden of persuasion on issue of invalidity; burden of going forward to establish case for invalidity and burden of persuasion on issue of invalidity were properly imposed on defendant. Fed. Rules Civ.Proc.Rule 56(c, e), 28 U.S.C.A.

**8. Patents ⇐312(1)**

In evaluating obviousness, hypothetical person of ordinary skill in the pertinent art is presumed to have ability to select and utilize knowledge from other arts reasonably pertinent to the particular problem to which the claimed invention is directed. 35 U.S.C.A. § 103.

**9. Patents ⇐323.2(5)**

In patent infringement suit, no serious ambiguity resulted, and no error occurred,

when district court failed to make determinations as to how teaching of cited references could be combined to produce the patented invention in question, in that district court apparently cited references to demonstrate widespread knowledge in the art of each feature involved.

**10. Patents ⇐16(3)**

With respect to citation of prior art patent references to show obviousness of claimed invention, suggestion to modify the art to produce the claimed invention need not be expressly stated in one or all of the cited references; rather, test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. 35 U.S.C.A. § 103.

**11. Patents ⇐323.2(4)**

Declaration of head of patent owner's design engineering department failed to raise contested issues of fact as would preclude granting of summary judgment in patent infringement action, where the declaration, while attempting to highlight differences between teachings of cited references and the claimed invention, largely summarized their contents and, at most, offered interpretation of undisputed factual evidence. Fed.Rules Civ.Proc.Rule 56(c, e), 28 U.S.C.A.; 35 U.S.C.A. § 103.

**12. Patents ⇐323.2(4)**

In determining obviousness issue on defendant's motion for summary judgment in patent infringement suit, trial court properly gave little weight to declaration of patent owner's chief financial officer which made minimal showing as to commercial success of the claimed invention, and to allegation, supported by ambiguous evidence, that alleged infringer copied the claimed invention. Fed.Rules Civ.Proc. Rule 56(e), 28 U.S.C.A.; 35 U.S.C.A. § 103.

**13. Patents ⇐16.29**

Patent No. 4,343,032, relating to photo-sensitive electric lamp able to turn itself on by degree as ambient light diminishes, is invalid for obviousness. 35 U.S.C.A. § 103.

**14. Federal Courts** ¶1137

Court of Appeals for the Federal Circuit had jurisdiction to review appeal from nonpatent counts, under statute governing jurisdiction of Court of Appeals for the Federal Circuit [28 U.S.C.A. § 1295(a)], in patent infringement suit in which district court ultimately exercised its jurisdiction over the patent count under 28 U.S.C.A. § 1338(a).

**15. Trade Regulation** ¶478

Apart from what must be shown regarding an alleged copy in order to impose liability for copying, protection under Lanham Act [Lanham Trade-Mark Act, § 1 et seq., 15 U.S.C.A. § 1051 et seq.] of physical details and design of a product may be available if such features both have acquired secondary meaning and are non-functional.

**16. Federal Civil Procedure** ¶2493

In action by manufacturer of night light against competitor for alleged false designation origin prohibited under § 43(a) of the Lanham Act, genuine issues of material fact existed with respect to functionality of actual design of the device, precluding summary judgment. Lanham Trade-Mark Act, § 43(a), 15 U.S.C.A. § 1125(a); Fed.Rules Civ.Proc.Rule 56(c), 28 U.S.C.A.

**17. Patents** ¶165(1)

In evaluating arguments made on behalf of right to obtain or retain a patent, proper object of scrutiny is meaning of patent claims when compared to teachings of prior art.

**18. Trade Regulation** ¶401

In assessing right to protection from unfair product copying, proper object of attention is actual marketplace of design of and marketing practices for an allegedly copied product when compared to those of the alleged copy. Lanham Trade-Mark Act, § 43(a), 15 U.S.C.A. § 1125(a).

**19. Trade Regulation** ¶412

For purposes of evaluating existence or impact of product copying, relevance of patent figures depends on extent to which their appearance is replicated in the actual

marketplace product of the patentee. Lanham Trade-Mark Act, § 43(a), 15 U.S.C.A. § 1125(a).

**20. Federal Civil Procedure** ¶2493**Trade Regulation** ¶722

In night light manufacturer's action against competitor for unfair competition, dilution, and infringement of manufacturer's rights in state trademark registration number, genuine issues of material fact existed with respect to functionality of actual design of the device in question, precluding summary judgment. Fed.Rules Civ.Proc.Rule 56(c), 28 U.S.C.A.

**21. Courts** ¶96(5)

When issue of federal-state preemption in area of federal patent laws and state trade regulation laws is reviewed in Court of Appeals for the Federal Circuit, the Court will apply law that has evolved in regional circuit in which the case containing the issue was originally tried.

**22. Federal Courts** ¶938

Where district court erroneously failed to look to law of regional circuit for standards of methodology to be applied in determining proper reach of preemptive effect of federal patent laws in relation to state trade regulation laws in action alleging unfair competition, dilution, and infringement of state trademark rights, district court's grant of summary judgment as to the state actions would be vacated and those causes remanded for reconsideration under local circuit law.

Paul J. Sutton, New York City, argued for appellant. With him on the brief were Barry G. Magidoff and Anthony Amaral, Jr.

Alan H. MacPherson, Skjervén, Morrill, MacPherson, Franklin & Friel, San Francisco, Cal., argued for appellee. With him on the brief were Thomas J. Friel, Jr. and Daniel E. Weil.

Before BENNETT, Circuit Judge, MILLER, Senior Circuit Judge,\* and SMITH, Circuit Judge.

BENNETT, Circuit Judge:

#### I. BACKGROUND

This is an appeal from the United States District Court for the Northern District of California<sup>1</sup> which through its grants of summary judgment favorable to defendant Genmark, Inc. (Genmark), on February 29, 1984,<sup>2</sup> and May 25, 1984,<sup>3</sup> rendered a final judgment in Civil Docket No. C-83-0897-WWS, an action for patent infringement, federal false designation of origin, state unfair competition, and state trademark infringement.

The original complaint in this action was filed February 25, 1983, and accused Gen-

mark of infringement of United States Patent No. 4,343,032 issued to Frederic W. Schwartz (the Schwartz patent) and owned by plaintiff Cable Electric Products, Inc. (Cable). The Schwartz patent relates to a photosensitive electric lamp able to turn itself on by degree as ambient light diminishes. As illustrated in Fig. 1 from the Schwartz patent, appearing below with unnecessary reference characters omitted, such a lamp includes a housing 10 which supports a light bulb 18 enclosed by a removable translucent shade 24. A lens 12 on the front of housing 10 permits ambient light to reach electrical circuitry and effect the operation described above. The device obtains power from a conventional electric wall receptacle through a pair of contact blades 14 at the rear of housing 10.

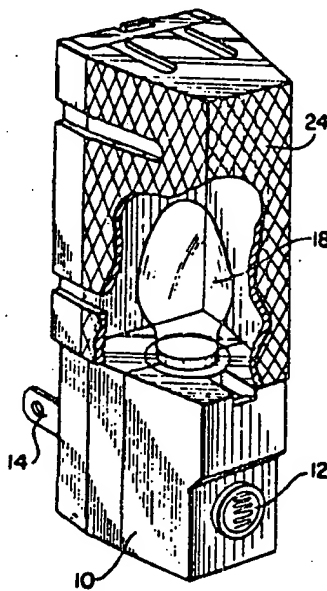


FIG. 1

On October 11, 1983, Genmark filed a first motion for summary judgment. The following day Cable moved for leave to

amend its complaint to include, in addition to the patent count already joined, three others not based on any patent. The re-

\* The Honorable Jack R. Miller assumed senior status effective June 6, 1985.

1. The Honorable William W. Schwarzer, District Judge.

2. 582 F.Supp. 93, 223 USPQ 287.

3. 586 F.Supp. 1505, 223 USPQ 291.

requested leave to amend was granted November 17, 1983. Subsequently, Genmark's first motion for summary judgment as to the patent count was granted. Thereafter, on April 24, 1984, Genmark made a second motion for summary judgment, this time as to the three counts added to the litigation by the amended complaint. The second motion was also granted, and the present appeal resulted.

We affirm the grant of summary judgment as to the patent infringement count, vacate the grant of summary judgment as to the nonpatent counts, and remand these for further appropriate deliberations.

The judgments will be reviewed below in the order granted.<sup>4</sup>

## II. THE PATENT COUNT

The district court dealt with the Genmark motion for summary judgment on the patent infringement count of the original complaint of Cable Electric in a Memorandum of Opinion and Order dated February 29, 1984 (the patent opinion)<sup>5</sup>. There it stated, "[T]he Court finds that, although defendant cannot establish that its device does not infringe plaintiff's patent, defendant does meet its burden of proof in establishing the obviousness of plaintiff's claimed invention under 35 U.S.C. § 103 without raising a genuine dispute of material fact." The Genmark motion was accordingly granted, and the Schwartz patent invalidated.

Cable Electric attacks that judgment scattershot fashion with a laundry list of

objections which fall into the two general areas of inquiry suggested by Fed.R.Civ.P. 56(c),<sup>6</sup> namely, (1) the existence of genuine issues of material fact and (2) the entitlement of the movant to judgment as a matter of law. In the former category, it is asserted that the obviousness standard used by the district court evidences a level of uncertainty which implies the existence of genuine issues of material fact, and that affidavits or deposition testimony submitted in opposition to the summary judgment motion raise contested issues of material fact with regard to the scope and content of the prior art, the differences between that art and the claims at issue, the commercial success of the product embodying those claims, and the copying of that product by Genmark as demonstrating non-obviousness. It is asserted that the evidence on these issues was not viewed in a light most favorable to Cable, the opponent of summary judgment.

Regarding the law employed, Cable contends that the district court erred in that it shifted the burden of persuasion on invalidity, failed to determine that the art relied on to invalidate the Schwartz patent was more pertinent than that considered during prosecution, did not specifically indicate the combination of teachings that would yield the claimed invention, gave inadequate consideration to commercial success and copying as secondary indicia of nonobviousness, and applied an incorrect obviousness standard, which included, among other alleged

4. The discussion to follow can be summarized in outline form, which for the convenience of the reader is provided below:

### I. BACKGROUND

### II. THE PATENT COUNT

- A. Summary Judgment
- B. Harmful Error
- C. Burdens of Proof
- D. Prior Art
- E. Hodgetts Declaration
- F. Secondary Factors
  - 1. Commercial Success
  - 2. Product Copying
- G. Disposition

### III. THE NONPATENT COUNTS

- A. Lanham Act
- B. State Causes of Action

- 1. Choice of Law
- 2. Preemption
- 3. Disposition

### IV. CONCLUSION APPENDIX

5. See *supra* note 2.

6. Fed.R.Civ.P. 56(c) states in relevant part:

"The judgment sought shall be rendered forthwith if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law."

deficiencies, a failure to consider the claimed invention as a whole.

We find these assertions individually and collectively to be without merit. The patent opinion of the district court is well reasoned and, in light of the record upon which it is based, adequate, accurate, and amply justified. The following discussion substantiates our conclusion.

#### A. Summary Judgment

Some comments on the use and appellate review of summary judgment are required to provide a frame of reference for a discussion of the record.

[1] A number of objections by Cable are essentially complaints that the district court did not adequately amplify its reasoning and the underlying factual inferences on which it relied in granting summary judgment. Fed.R.Civ.P. 56(c), however, makes it clear that the circumstances in which a grant of summary judgment is proper are circumstances in which a district court need not function as an arbiter among differing versions of every factual reality for which evidentiary support has been presented. Instead, the circumstances appropriate to summary judgment are those in which a district court is able to conclude that, with regard to any factual issues material to granting judgment as a matter of law, no genuine dispute exists. Thus, it manifests incorrect expectations to fault a district court in granting summary judgment for a failure to find particular facts. To engage in fact finding would be not only inappropriate, but would per se

imply the impropriety of the grant. See *Lemelson v. TRW, Inc.*, 760 F.2d 1254, 1260-61, 225 USPQ 697, 700-01 (Fed.Cir. 1985).

Additionally, although Fed.R.Civ.P. 52(a) provides that a "court shall find the facts specially and state separately its conclusions of law thereon," the rule contains the pertinent qualification that "[f]indings of fact and conclusions of law are unnecessary on decisions of motions under Rules 12 or 56." *Accord Helena Rubinstein, Inc. v. Bau*, 433 F.2d 1021, 1024, 167 USPQ 711, 713 (9th Cir.1970); *Fromberg, Inc. v. Gross Manufacturing Co.*, 328 F.2d 803, 806, 140 USPQ 641, 643 (9th Cir.1964). An exception, which we do not consider to be applicable here, can be found in Fed.R. Civ.P. 56 in the case of grants of partial summary judgment.<sup>7</sup> Assuredly, to know the reasoning a district court used in deciding to grant summary judgment facilitates the task of a reviewing court, and there does exist a risk in complicated cases of an unnecessary reversal if the logic that resulted in a grant of summary judgment cannot be discerned. See *Petersen Manufacturing Co. v. Central Purchasing, Inc.*, 740 F.2d 1541, 1546, 222 USPQ 562, 566 (Fed.Cir.1984). Nevertheless, in light of the record before us and the patent opinion of the district court, the issues in this case present no such degree of complexity as would preclude affirmance, due to any failure of the district court to make the basis of its holding clear.

Thus, the complaint of Cable as to the insufficiency of "the factual findings of the

#### 7. Fed.R.Civ.P. 56(d) states:

"*Case Not Fully Adjudicated on Motion.* If on motion under this rule judgment is not rendered upon the whole case or for all the relief asked and a trial is necessary, the court at the hearing of the motion, by examining the pleadings and the evidence before it and by interrogating counsel, shall if practicable ascertain what material facts exist without substantial controversy and what material facts are actually and in good faith controverted. It shall thereupon make an order specifying the facts that appear without substantial controversy, including the extent to which the amount of damages or other relief is not in controversy, and directing such further proceedings in the action as are just. Upon the

trial of the action the facts so specified shall be deemed established, and the trial shall be conducted accordingly."

While the patent decision of the district court did not immediately dispose of "the whole case" brought by Cable, within 3 months a second order of summary judgment had decided the balance of the case. Consequently, no trial has proved necessary. As both summary judgment orders are before us in this appeal, and as the parties have not premised any arguments upon the fact that the initial, patent opinion was "not rendered upon the whole case," we view the exception of Fed.R.Civ.P. 56(d) as not applicable in any way here to increase the duty of the district court to find facts specially.

District Court on the scope and content of the prior art [or] ... the differences between the prior art and the claims at issue" is unpersuasive for at least three reasons. First, the presence of findings would signal the possible existence of disputed issues of material fact, none of which we discern to exist. Second, there is no legal requirement that the rationale behind a nonpartial grant of summary judgment, including a recitation of undisputed factual inferences and applications of legal principles, be made explicit. The only requirement in this regard is pragmatic, with an eye toward judicial economy and communication with the litigants. Finally, in this instance, the premise underlying the argument is simply incorrect. Contrary to the hyperbole of Cable, the patent opinion of the district court evidences that it considered and, in view of the straightforward nature of this case, adequately discussed the issues involved.

[2] On this basis, we also dispose of the charge by Cable that the district court "failed to make a factual determination as to whether any of these [prior art patent] references were or were not more pertinent than the art considered by the Patent and Trademark Office during the prosecution of the patent-in-suit." Cable cites *Jones v. Hardy*, 727 F.2d 1524, 1529, 220 USPQ 1021, 1025 (Fed.Cir.1984), as condemning the omission of such a determination. Nevertheless, in *Jones* the appeal was from a judgment rendered after a 2-day trial, rather than one from summary judgment, and the failure of the lower court opinion to contain a *factual* determination as to pertinency was but one of many, more major flaws in the obviousness analysis cited by this court in reversing a conclusion of invalidity. The analysis faulted in *Jones* included, for example, a denial of the "statutory presumption of validity and an impermissible burden-shifting," *id.*, which, as will be discussed below, did not occur here. Cf. *King Instruments Corp. v. Otari Corp.*, 767 F.2d 853, 857, 226 USPQ 402, 404 (Fed.Cir.1985) (referring to the failings

in the *Jones* analysis as a "parade of horrors"). A determination on pertinency may in some cases afford insight into the reasoning of the factfinder, but it is not strictly a requirement under *Graham v. John Deere Co.*, 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545, 148 USPQ 459 (1966), for a proper obviousness analysis.

Review of the grant of summary judgment at issue then first requires review of the evidence relevant to the factual inquiries of *Graham*, including evidence relevant to the secondary considerations, in order to determine whether any genuine issue exists as to facts material to reaching a conclusion on obviousness. *Cooper v. Ford Motor Co.*, 748 F.2d 677, 679, 223 USPQ 1286, 1287-88 (Fed.Cir.1984). If not, and if viewing that evidence in a light most favorable to the nonmovant and drawing in favor thereof all inferences as are reasonable, the moving party is entitled to judgment as a matter of law, the grant of summary judgment will be affirmed. *Id.* at 679, 223 USPQ at 1288.

#### B. Harmful Error

[3,4] In such analysis as Cable is willing to acknowledge was included by the district court in its patent opinion, several errors are alleged. Nevertheless, as obviousness under 35 U.S.C. § 103 (1982) is a conclusion of law subject to our full and independent review, *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 1344, 220 USPQ 777, 782 (Fed.Cir.) (in banc), *cert. denied*, — U.S. —, 105 S.Ct. 116, 83 L.Ed.2d 60, 225 USPQ 232 (1984), reversal in this instance would require more than a mere demonstration of error in analysis. Even assuming that such errors were committed, Cable must demonstrate that if the errors were corrected, the application of the law to the facts present would produce a different result. *Union Carbide Corp. v. American Can Co.*, 724 F.2d 1567, 1573, 220 USPQ 584, 589 (Fed.Cir.1984). In short, such errors as may be demonstrated must have further been harmful. See 28 U.S.C.

§ 2111.<sup>8</sup> *Accord Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1580, 219 USPQ 8, 12 (Fed.Cir.1983).

### C. Burdens of Proof

[5, 6] The burdens of demonstrating the absence of genuine issues of material fact and the entitlement to judgment as a matter of law is upon the summary judgment movant, *Genmark*. *Cooper*, 748 F.2d at 679, 228 USPQ at 1288. In this instance, as *Genmark* is also the party asserting the invalidity of a United States patent, the burden of demonstrating an entitlement to judgment as a matter of law includes the burden of overcoming the presumption of patent validity found in 35 U.S.C. § 282.<sup>9</sup> *Cable* claims that, despite explicit mention by the district court, the presumption of validity was not observed. The presumption of section 282 is "a procedural device which places on a party asserting invalidity the initial burden of going forward to establish a prima facie case on that issue." *Lear Siegler, Inc. v. Aeroquip Corp.*, 733 F.2d 881, 885, 221 USPQ 1025, 1028 (Fed. Cir.1984). While "the burden of persuasion on the issue of invalidity also rests throughout the litigation with the party asserting invalidity," *id.*, if evidence is presented establishing a prima facie case of invalidity, the opponent of invalidity must come forward with evidence to counter the prima facie challenge to the presumption of section 282. This requirement is in no way contrary to the procedural role of the presumption of validity. Nor does it in sub-

stance shift the burden of persuasion on the issue. "In the end, the question is whether all the evidence establishes that the validity challenger so carried his burden as to have persuaded the decisionmaker that the patent can no longer be accepted as valid." *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530 at 1534, 218 USPQ at 876 (Fed.Cir.1983).

[7] Likewise, on a motion for summary judgment, the burden is upon the movant in support thereof to demonstrate an absence of genuine issues of material fact and then the entitlement to judgment at law. Fed.R.Civ.P. 56(c).<sup>10</sup> If a showing is made that would entitle the movant to judgment unless contradicted, then Fed.R. Civ.P. 56(e)<sup>11</sup> states that the nonmovant has the burden to show that such a contradiction is possible; it cannot rest upon its allegations and pleadings. *First National Bank v. First Bank Stock Co.*, 306 F.2d 937, 943 (9th Cir.1962). Indeed, this "shift of burden and the duty to come forward with possible contradiction of proof is the essence of Fed.R.Civ.P. 56." *DeLong Corp. v. Raymond International, Inc.*, 622 F.2d 1135, 1144, 206 USPQ 97, 104 (3d Cir.1980) (cited and quoted in part in *D.L. Auld Co. v. Chroma Graphics Corp.*, 714 F.2d 1144, 1150, 219 USPQ 13, 17-18 (Fed. Cir.1983)). Here, once *Genmark* had established its prima facie case for summary judgment, which would have included a prima facie case for overcoming the presumption of validity, it fell upon *Cable* to submit evidence setting forth specific facts raising

8. 28 U.S.C. § 2111 (1982) reads as follows:

"Harmless error. On the hearing of any appeal or writ of certiorari in any case, the court shall give judgment after an examination of the record without regard to errors or defects which do not affect the substantial rights of the parties."

9. 35 U.S.C. § 282 (1982) contains the following first paragraph:

#### "Presumption of validity; defenses

"A patent shall be presumed valid. Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though

dependent upon an invalid claim. The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity."

10. See *supra* note 6.

11. Fed.R.Civ.P. 56(e) states in relevant part:

"When a motion for summary judgment is made and supported as provided in this rule, an adverse party may not rest upon the mere allegations or denials of his pleading, but his response, by affidavits or as otherwise provided in this rule, must set forth specific facts showing that there is a genuine issue for trial. If he does not so respond, summary judgment, if appropriate, shall be entered against him."



Cite as 770 F.2d 1015 (1985)

a genuine issue for trial. *First National Bank v. Cities Service Co.*, 391 U.S. 253, 289, 88 S.Ct. 1575, 1592, 20 L.Ed.2d 569, *reh'g denied*, 393 U.S. 901, 89 S.Ct. 63, 21 L.Ed.2d 188 (1968). This Cable clearly understood when it submitted, in opposition to the summary judgment motion of Genmark, deposition testimony and various declarations which it contended raised genuine issues of material fact relative to an obviousness analysis under *Graham*. In commenting on the effectiveness of one of these declarations in presenting evidence of factual issues requiring trial, the district court said "[p]laintiff [Cable] seeks to avoid summary judgment by introducing the declaration of an expert that, it claims, raises genuine issues of material fact." 582 F.Supp. at 97; 223 USPQ at 291. It is now contended that the "avoid summary judgment" phrase of this statement demonstrates that the district court improperly shifted to Cable, the patentee, the burden of persuasion on the issue of invalidity. We disagree.

For reasons to be discussed below, and with which we concur, the district court deemed the affidavits submitted by Cable to have been inadequate to show any genuinely contested issues of material fact. Thus, Cable failed in the duty imposed upon it by Fed.R.Civ.P. 56(e) to rebut the *prima facie* case for summary judgment by showing "that there is a genuine [factual] issue for trial." Contrary to the argument of Cable, this duty is distinct from that of "requiring that the evidence 'persuade' the court of patentability," which was condemned in *Jones v. Hardy*, 727 F.2d at 1528, 220 USPQ at 1025. The avoidance of summary judgment as to patent invalidity does not represent a shift of the burden of going forward to establish a case for invalidity or the burden of persuasion on the issue of invalidity. Under section 282 these burdens were imposed on Genmark, and we have not been given the impression that the district court shifted them to Cable. The stray and inconsequential quotations proffered in this regard from the

summary judgment hearing add nothing to the meritless claim that the presumption of validity was not observed.

#### D. Prior Art

The district court opinion invalidating the Schwartz patent mentions a number of prior art patent references. Among these, U.S. Patent No. 3,968,355 to Smallegan (the Smallegan patent) discloses a night light controlled by a photosensitive switch and operated from an electric wall receptacle. It is undisputed that this reference alone teaches all of the limitations in the claims of the Schwartz patent, save those pertaining to what is termed in claim 1 thereof<sup>12</sup> "a shade of predetermined shape and appearance." In this regard, however, the Smallegan patent does contain a specific suggestion for providing some sort of shade about the bulb of the device to reduce the effect of the bulb on the photosensitive control, and other references discussed below exhibit the shade details recited in the patent in suit.

For example, U.S. Patent No. 3,694,607 to Fontana and U.S. Patent No. Des. 205,371 to Mellyn, from which Fig. 3 is included here, disclose bottom-mounted night light shades which "frictionally engage and disengage in a snap-on manner ... said [lamp] housing in a position ... facilitating repeated replacement of said bulb," as is recited in claim 1 of the Schwartz patent.

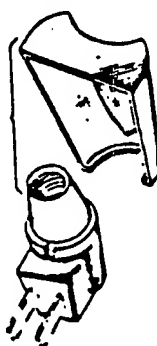


FIG. 3

Additionally, U.S. Patents Nos. Des. 207,500 and Des. 208,939, both also to Mellyn, show such shades having "front and side

by way of illustration in the Appendix to this opinion.

<sup>12</sup> Claim 1, the sole independent claim of the three claims in the Schwartz patent, is included

wall portions." Figs. 1 and 2 of the latter patent are included below and depict a shade fully described by the following limitation from claim 1 of the patent in suit:

[S]aid front wall portion [has] a generally planar surface extending between generally rectangular edges including longer vertically extending edges and relatively

shorter horizontally extending edges, said side wall portions extending in a diverging manner generally symmetricaly at a predetermined angle greater than 90 degrees away from said front wall portion toward a rearward plane of said [lamp] housing...."

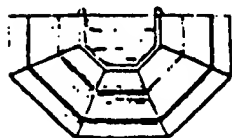


FIG. 1

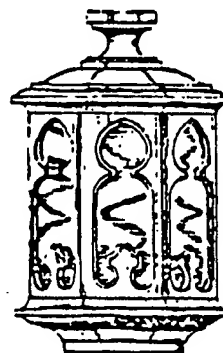


FIG. 2

All of these references are from the electric night light art, the same as that of the patent in suit and of the Smallegan patent. Based on the explicit suggestions for a shade contained in the latter, teachings of these references could have been combined to produce a device meeting all the limitations of claim 1 of Schwartz except for

having "a generally polygonal-shaped pattern extending over substantially the entire front wall portion" of the shade.

This feature, however, can be found in the following patents among those mentioned by the district court as examples of such a teaching:

U.S. Patent No.

Des. 127,892  
3,549,879  
3,265,887  
2,978,575

Patentee

Ohm  
Meyer  
Wince  
Cohen

None of these deal with shades for night lights specifically, but rather with shades for overhead lighting fixtures. Cable argues that these would use florescent light bulbs in contrast to the incandescent-type employed with the night light of the Schwartz patent. The declaration of 33-year Cable employee, Harry Hodgetts, head of the company's design engineering department (the Hodgetts declaration), attempts to puff up the difference between the two types of light bulbs as presenting "entirely different light diffusing prob-

lems," but fails absolutely to elaborate the nature of the purported differences. Such unsupported conclusional statements are not helpful in affidavits used to "avoid summary judgment."

[8] The references demonstrate that polygonal patterning on light shades was old in the lighting art, even if not in the narrow field of night lights. Each reference addresses a problem confronted by the Schwartz patent, namely, the diffusion of light from an electric bulb, be it incandescent or florescent, through a translucent

shade. In evaluating obviousness, the hypothetical person of ordinary skill in the pertinent art is presumed to have the "ability to select and utilize knowledge from other arts reasonably pertinent to [the] particular problem" to which the claimed invention is directed. *In re Antle*, 444 F.2d 1168, 1171-72, 170 USPQ 285, 287-88, 58 C.C.P.A. 1382, 1385-88 (1971); see, e.g., *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1460, 221 USPQ 481, 487 (Fed.Cir. 1984). Assuming arguendo that these four references are not strictly within the field of art represented by Schwartz, they are easily within a field analogous thereto, and their teachings are properly combinable with the earlier references discussed above. See *Union Carbide Corp. v. American Can Co.*, 724 F.2d 1567, 1572, 220 USPQ 584, 588 (Fed.Cir.1984) (quoting *In re Wood*, 599 F.2d 1032, 1036, 220 USPQ 171, 174 (CCPA 1979)).

[9] Cable faults the district court for failing to make determinations as to how teachings of the references could be combined to produce the patented invention. Nevertheless, the straight-forward quality of the invention and art involved make the required combination quite apparent. The district court pointed out features in each reference; presumably it was these that were to be joined. As to most teachings, several references were cited without delineating a single one of the group for combination with references showing other features. The district court did so apparently to demonstrate the widespread knowledge in the lighting art of each feature involved. As no serious ambiguity resulted, we observe no error in this.

[10] Further, the suggestion to modify the art to produce the claimed invention need not be expressly stated in one or all of the references used to show obviousness. "Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981) (and cases cited therein); *Leinoff v. Louis Milona &*

*Sons, Inc.*, 726 F.2d 734, 739, 220 USPQ 845, 848-49 (Fed.Cir.1984). The district court in invalidating the Schwartz patent relied exclusively and correctly on "knowledge clearly present in the prior art." *In re Sernaker*, 702 F.2d 989, 995, 217 USPQ 1, 6 (Fed.Cir.1983). In this respect it is to be sustained.

#### E. Hodgetts Declaration

[11] Cable claims that the Hodgetts declaration, if viewed "in a light most favorable" to Cable, raises genuine issues of material fact in relation to the inquiries required by *Graham* dealing with scope and content of the prior art and the differences between that art and the claims at issue. With respect to the references discussed above, the declaration adds little, if anything, not already in the record. While attempting to highlight differences between the teachings of the references and the claimed invention, it largely summarizes their contents and is thus duplicative in a manner which fails to demonstrate any genuine dispute as to issues of material fact and is not helpful in resolving patentability problems. "What we do find helpful is facts of which we would not otherwise be aware." *In re Vamco Machine & Tool, Inc.*, 752 F.2d 1564, 1576, 224 USPQ 617, 624 (Fed.Cir.1985).

The declaration states the opinion that "the patented invention of the Schwartz patent ... [would] not [have been] obvious to one of ordinary skill in the night light art" from the teachings of the references discussed. Obviousness, however, is a question of law.

Opinion testimony by experts concluding that an invention would or would not have been obvious may influence the court's decision, but conflicting opinions on a legal issue vel non raise no issue of contested fact. Nor is the court's conclusion on obviousness an adverse inference of fact.

*Petersen Manufacturing Co. v. Central Purchasing, Inc.*, 740 F.2d 1541, 1548, 222 USPQ 562, 567 (Fed.Cir.1984) (citations omitted).

We reject the contention that the Hodgetts declaration raised contested issues of fact. At most, the declaration offered an *interpretation* of undisputed factual evidence, but did not set forth specific conflicting facts that showed a genuine issue requiring trial.

#### F. Secondary Factors

In making a determination on obviousness under 35 U.S.C. § 103, *Graham v. John Deere Co.*, 383 U.S. at 17, 86 S.Ct. at 693, 15 L.Ed.2d at 556, 148 USPQ at 467, sets forth, as providing "background," "several basic factual inquiries," including the content of the prior art, the difference between that art and the claimed subject matter, and the level of ordinary skill in the subject art. In addition, it is suggested that certain "secondary considerations" which "give light to the circumstances surrounding the origin of the [patented] subject matter" may have relevancy as "indicia of obviousness or nonobviousness." *Id.* at 17-18, 86 S.Ct. at 693-694, 15 L.Ed.2d at 556-557, 148 USPQ at 467. The opinions of this court have suggested that evidence on these secondary considerations is to be taken into account *always*, "not just when the decisionmaker remains in doubt after reviewing the art." *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1539, 218 USPQ 871, 879 (Fed.Cir.1983). See *Simmons Fastener Corp. v. Illinois Tool Works, Inc.*, 739 F.2d 1573, 1575, 222 USPQ 744, 746 (Fed.Cir.1984), *cert. denied*, — U.S. —, 105 S.Ct. 2138, 85 L.Ed.2d 496 (1985); *Radio Steel & Manufacturing Co. v. MTD Products, Inc.*, 731 F.2d 840, 846, 221 USPQ 657, 662 (Fed.Cir.), *cert. denied*, — U.S. —, 105 S.Ct. 119, 83 L.Ed.2d 62 (1984); *Jones v. Hardy*, 727 F.2d at 1530, 220 USPQ at 1027; *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1549, 220 USPQ 193, 197 (Fed.Cir.1983).

Nevertheless, a "nexus between the merits of the claimed invention and the evidence of secondary considerations is required in order for the evidence to be given substantial significance in an obviousness decision." *Simmons Fastener*, 739 F.2d at 1575, 222 USPQ at 746, *Stratoflex*, 713

F.2d at 1539, 218 USPQ at 879. Thus, the weight to be accorded evidence on secondary considerations is to be carefully appraised in relation to the facts of the actual case in which it is offered. See *EWP Corp. v. Reliance Universal, Inc.*, 755 F.2d 898, 908, 225 USPQ 20, 26 (Fed.Cir.1985); *In re Vamco Machine & Tool, Inc.*, 752 F.2d 1564, 1574-77, 224 USPQ 617, 623-25 (Fed.Cir.1985); see also Address by D. Chisum, AIPLA Annual Meeting (October 26, 1984), reprinted in 1984 AIPLA Bull. 618, 620 ("secondary not because they are secondary in importance [but] ... because they are relevant through a process of inference to the ultimate technical issue of nonobviousness [and being] ... relevant through a chain of inference, their force may be weakened for a variety of reasons").

[12] Cable claims that a trial is required due to the existence of contested issues of material fact regarding (1) the commercial success of the Cable device embodying the claims of the Schwartz patent and (2) the copying of that device by Genmark.

#### 1. Commercial Success.

Cable relies on the declaration of its chief financial officer, George Lema, executed October 31, 1982 (the Lema declaration). Relevant to this issue, it states only the following:

Plaintiff [Cable] began manufacturing its night light in 1978. Since the introduction of that night light, over 5 million units have been sold. Profits of not less than fifty (\$.50) cents per unit have been realized by plaintiff. Plaintiff's night light has been distributed nationwide in major department store chains and local hardware outlets.

Genmark has not disputed this statement, so it is to be accepted for what it shows. *Union Carbide*, 724 F.2d at 1575, 220 USPQ at 591.

Nevertheless, what it shows in relation to commercial success is fairly minimal. Without further economic evidence, for example, it would be improper to infer that the reported sales represent a substantial share of any definable market or whether

the profitability per unit is anything out of the ordinary in the industry involved. This type of information might bolster the existence in fact of any commercial success which may be demonstrated by the Lema declaration, but even assuming commercial success were clearly shown, Cable would face an additional hurdle before the Lema declaration could prove pertinent to nonobviousness.

As the district court correctly pointed out in declining to give weight to the Lema declaration on the issue of commercial success as an indicator of nonobviousness, this court in *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed.Cir. 1983), has unequivocally stated that for commercial success of a product embodying a claimed invention to have true relevance to the issue of nonobviousness, that success must be shown to have in some way been due to the nature of the claimed invention, as opposed to other economic and commercial factors unrelated to the technical quality of the patented subject matter. Thus, a "nexus is required between the merits of the claimed invention and the evidence offered, if that evidence is to be given substantial weight enroute to [a] conclusion on the obviousness issue." *Id.* at 1539, 218 USPQ at 879. *Accord EWP Corp. v. Reliance Universal, Inc.*, 755 F.2d 898, 908, 225 USPQ 20, 26 (Fed. Cir.1985) ("a 'secondary consideration' must be carefully appraised as to its evidentiary value"); *Simmons Fastener Corp. v. Illinois Tool Works, Inc.*, 739 F.2d 1573, 1575, 222 USPQ 744, 746 (Fed.Cir. 1984), *cert. denied*, — U.S. —, 105 S.Ct. 2138, 85 L.Ed.2d 496 (1985); *In re Vamco Machine & Tool, Inc.*, 752 F.2d 1564, 1577, 224 USPQ 617, 625 (Fed.Cir.1985); *see also Ruben Condenser Co. v. Aerovox Corp.*, 77 F.2d 266, 268, 26 USPQ 62, 63 (2d Cir.), *cert denied*, 296 U.S. 623, 56 S.Ct. 145, 80 L.Ed. 443 (1935) (where Judge Learned Hand stated, "While it is always the safest course to test a putative invention by what went before and what came after, it is easy to be misled. Nothing is less reliable than uncritically to accept its welcome by the art, even though it displace[s] what went

before"). Viewed in a light most favorable to Cable, from the Lema declaration an inference of some commercial success might be deduced, but as to establishing any "nexus" between that hypothetical success and "the merits of the claimed invention," no evidence was submitted in the declaration or elsewhere that could justify giving weight to the declaration in reaching a conclusion on obviousness. After considering the Lema declaration the district court correctly determined to accord it no weight.

## 2. Product Copying.

Cable alleges that Genmark copied the Cable night light in designing the accused infringing device and that this alleged copying is evidence of nonobviousness of the Schwartz patent. The evidence in support of the charge of copying in designing the Genmark product is ambiguous, even viewed in a light favorable to Cable. Deposition testimony of Thomas E. Corder, president of Diablo Technologies, Inc., apparently a successor of Diablo Products Corp., was offered on this point, but Genmark's own characterization of the implication of this evidence was merely that it showed that Corder "had access to and analyzed the appearance of plaintiff's night light during the period he was developing the accused Diablo [later Genmark] night light." Access to, and analysis of, other products in the market is hardly rare, even in the design stages of competing devices. Access in combination with similarity can create a strong inference of copying, but here Cable, as noted by the district court, failed to submit into evidence a sample of its own device for comparative purposes in evaluating the extent of similarity.

The Lema declaration states that "defendant [Genmark] deliberately copied plaintiff's night light when it designed its own night light," but only on information and belief, which under Fed.R.Civ.P. 56(e) is an inadequate basis upon which to base affidavits supporting or opposing summary

judgment.<sup>13</sup> Thus, in this instance, product copying at the design stage would be a strained inference.

Further, in pressing the relevance to non-obviousness of purported copying by Genmark, "[a]s is often the case [Cable] failed to distinguish infringement by a defendant from that of numerous other competitors." Note, *Subtests of "Nonobviousness": A Nontechnical Approach to Patent Validity*, 112 U.Pa.L.Rev. 1169, 1179 n. 51 (1964) (cited in *Graham v. John Deere Co.*, 383 U.S. 1, 18, 86 S.Ct. 684, 694, 15 L.Ed.2d 545, 148 USPQ 459, 467 (1966), as relevant to the decision of the Supreme Court to include secondary indicia in the prescribed obviousness determination). It is our conclusion that more than the mere fact of copying by an accused infringer is needed to make that action significant to a determination of the obviousness issue. *Accord Vandenberg v. Dairy Equipment Co.*, 740 F.2d 1560, 1567, 224 USPQ 195, 199 (Fed. Cir.1984), where copying of a patented device, despite the failure of protracted efforts by the copyist to design a similar device, was found to be an admission of the mechanical superiority of the patented version, but "not strong evidence of nonobviousness."<sup>14</sup>

Rather than supporting a conclusion of obviousness, copying could have occurred out of a general lack of concern for patent property, in which case it weighs neither for nor against the nonobviousness of a specific patent. It may have occurred out of contempt for the specific patent in question, only arguably demonstrating obviousness, or for the ability or willingness of the patentee financially or otherwise to enforce the patent right, which would call for deeper inquiry. Even widespread copying could weigh toward opposite conclusions, depend-

ing on the attitudes existing toward patent property and the accepted practices in the industry in question. It is simplistic to assert that copying per se should bolster the validity of a patent.

We do not concur in the reasoning evidenced by the statement of the district court that "it is just as likely that the similarity (assuming it exists) is more attributable to the simple obviousness of plaintiff's design rather than to defendant's deliberate mimicry." 582 F.Supp. at 97, 223 USPQ at 290. The record simply offers nothing in this regard, and the speculation involved is unwarranted. Nevertheless, in view of Cable's poor showing as to copying and in view of the barrenness of the record on the "nexus" between any copying arguably shown and the nonobviousness of the claimed invention, it would have been improper to give the alleged copying by Genmark much weight in the obviousness analysis. Thus, the district court treated this issue appropriately, and its comment above as to the reason for copying, if any exists, is but harmless error.

#### G. Disposition

[13] Based on a review of the record as discussed above, it is our conclusion that the patent portion of this case was properly resolved by a grant of summary judgment and that the Schwartz patent is invalid as being directed to obvious subject matter. We can discern no such genuinely disputed questions of fact material to such a judgment as would warrant a trial.

The art involved is easily grasped. The difference between the teaching of each reference and the claimed subject matter is clear, as is how those teachings are to be combined to yield the subject invention.

opposed by depositions, answers to interrogatories, or further affidavits."

13. Fed.R.Civ.P. 56(e) states in relevant part:

"Supporting and opposing affidavits shall be made on personal knowledge, shall set forth such facts as would be admissible in evidence, and shall show affirmatively that the affiant is competent to testify to the matters stated therein. Sworn or certified copies of all papers or parts thereof referred to in an affidavit shall be attached thereto or served therewith. The court may permit affidavits to be supplemented or

14. That is not to say that copying is always irrelevant in the context of other evidence of nonobviousness. See *Jones v. Hardy*, 727 F.2d 1524, 1531, 220 USPQ 1021, 1026-27 (Fed.Cir. 1984); *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1540, 1541, 218 USPQ 871, 880 (Fed. Cir.1983).

No issue has been raised about the level of skill employed in analysis, that of an ordinary layman of average intelligence and one in this case most favorable to Cable Electric. *Cf. Chore-Time Equipment, Inc. v. Cumberland*, 713 F.2d 774, 779 n. 2, 218 USPQ 673, 676 n. 2 (Fed.Cir.1983). Secondary considerations for the reasons stated above have been given proper weight.

Cable raises objection to the statement of the district court that it "has no difficulty finding it more likely than not that ... a shade of the type plaintiff claims ... [is] an obvious solution" to the problem confronted by plaintiff. Naturally, a determination on the issue of obviousness is no "finding"; it is question of law. Nevertheless, this slip and the concomitant use of the phrase, "more likely than not," are but harmless rhetorical error. Elsewhere throughout the patent opinion the district court shows a good understanding of the nature of and analysis associated with reaching a conclusion on obviousness. Nor do we agree with Cable that the district court either was "confused as to what the claimed invention in suit was" or failed to consider that invention as a whole.

### III. THE NONPATENT COUNTS

[14] The district court granted the Genmark motion for summary judgment as to

15. See *supra* note 3.

16. 28 U.S.C. § 1338(a) (1982) states:

"Patents, plant variety protection, copyrights, trademarks, and unfair competition

"(a) The district courts shall have original jurisdiction of any civil action arising under any Act of Congress relating to patents, plant variety protection, copyrights and trademarks. Such jurisdiction shall be exclusive of the courts of the states in patent, plant variety protection and copyright cases."

17. 28 U.S.C. § 1295(a)(1) (1982) states:

"Jurisdiction of the United States Court of Appeals for the Federal Circuit

"(a) The United States Court of Appeals for the Federal Circuit shall have exclusive jurisdiction—

"(1) of an appeal from a final decision of a district court of the United States, the United States District Court for the District of the Canal Zone, the District Court of Guam, the District Court of the Virgin Islands, or the

the nonpatent counts of Cable's amended complaint in a second Memorandum of Opinion and Order dated May 25, 1984 (the second opinion).<sup>15</sup> As the district court ultimately exercised its jurisdiction over the patent count discussed above under the patent provision of 28 U.S.C. § 1338(a),<sup>16</sup> we have jurisdiction also to review the appeal of the remaining nonpatent counts under 28 U.S.C. § 1295(a).<sup>17</sup> *Bandag, Inc. v. Al Bolser's Tire Stores, Inc.*, 750 F.2d 903, 907-09, 223 USPQ 982, 984-85 (Fed.Cir. 1984). See also *Atari, Inc. v. JS & A Group, Inc.*, 747 F.2d 1422, 223 USPQ 1074 (Fed.Cir.1984) (in banc).

Nevertheless, in deciding these nonpatent matters we do so "in the light of the problems faced by the district court from which each count originated, including the law there applicable," *Bandag*, 750 F.2d at 909, 223 USPQ at 986, and in the remaining portions of this opinion we will be guided by the relevant law in the Ninth Circuit, to the extent it can be discerned.<sup>18</sup>

#### A. Lanham Act Cause of Action

Cable's federal nonpatent count is an action brought under the Lanham Act § 43(a), 15 U.S.C. § 1125(a) (1982). In essence, it is charged that the commercial configuration of the Cable night light has

District Court for the Northern Mariana Islands, if the jurisdiction of that court was based, in whole or in part, on section 1338 of this title, except that a case involving a claim arising under any Act of Congress relating to copyrights or trademarks and no other claims under section 1338(a) shall be governed by sections 1291, 1292, and 1294 of this title[.]"

18. It has been clearly stated that in appeals to this court under 28 U.S.C. § 1295(a) of cases involving patent and certain nonpatent counts, "it will be the role and duty of the advocates to brief and argue [the nonpatent counts] in the appeal ... just as if they were appearing ... before that circuit [from which the case originated]." *Atari*, 747 F.2d at 1440, 223 USPQ at 1087. Such a rule could not in all fairness be applied in this case, as both of the appealed summary judgment decisions were argued and decided and all of the appeal briefs to this court were prepared and filed prior to the statement of the rule. Nevertheless, future litigants will be expected to frame their discussion of appealed nonpatent counts appropriately.

come to designate origin, and thus that Genmark's use of an allegedly similar configuration in its own commercial product constitutes a prohibited false designation of origin.

[15] Apart from what must be shown regarding an alleged copy in order to impose liability for copying, protection under the Lanham Act of the physical details and design of a product may be available if such features both (1) have acquired secondary meaning and (2) are nonfunctional. *Vuitton Et Fils S.A. v. J. Young Enterprises, Inc.*, 644 F.2d 769, 772, 210 USPQ 351, 353-54 (9th Cir.1981).

The district court concluded that Cable was not entitled to protection as a matter of law, based on the second requirement, by concluding that the functionality of the Cable night light design was beyond dispute. To so conclude, it focused on the positions of Cable before the United States Patent and Trademark Office in obtaining allowance of the Schwartz utility patent and before the district court in opposing Genmark's motion for summary judgment on the patent count of this case. The argument Cable made was described as to the effect that the "night light's configuration was utilitarian—indeed, patentably so, providing special advantages in compactness, efficient bulb change, and light diffusion." 586 F.Supp. at 1508, 223 USPQ at 293. The district court thus held that Cable was bound by the argument it made on behalf of the nonobviousness of claims in a patent,<sup>19</sup> when the issue under consideration was the functionality of the actual design of a commercial device. In view of the considerations discussed below, the two can hardly be presumed to be even similar questions.

[16] Nonobviousness is a question of law fully reviewable on appeal. *Gardner*

19. An examination of the specification and prosecution history pertinent to the Schwartz patent, which are before us in the record, reveals no such argument made as to the utilitarian advantages mentioned by the district court. According to the customary practice, the argument of the parties below has not been included among the documents presented for our review. Thus,

*v. TEC Systems, Inc.*, 725 F.2d 1338, 1344, 220 USPQ 777, 782 (Fed.Cir.), *cert denied*, — U.S. —, 105 S.Ct. 116, 83 L.Ed.2d 60, 225 USPQ 232 (1984). On the other hand, functionality in the context of this case is a question of a highly factual nature. See *Vuitton*, 644 F.2d at 775, 210 USPQ at 356. When the district court ruled on the issue of functionality, it improperly deprived Cable of the right to have a fact-finding tribunal examine the actual evidence which has bearing on the functionality question.

Below it was not a matter of examining the evidence proffered and concluding that there existed "no genuine issue as to any material fact," as required for a grant of summary judgment. Fed.R.Civ.P. 56(c). That point in analysis was never reached, because rather than looking to the actual evidence on nonfunctionality, the district court chose to utilize arguments made in relation to the meaning of invalid patent claims as admissions against interest about the factual nature of a product design. It did this, as far as we can determine, without analytically verifying the soundness for doing so. The court appears not to have considered whether the meaning of those claims was so unavoidably identical to the details of the product design ultimately marketed as to warrant the desirability or suitability of the use of statements about the former as reliable or legally binding admissions about the latter.

[17,18] In evaluating arguments made on behalf of the right to obtain or retain a patent, the proper object of scrutiny is the meaning of patent claims when compared to the teachings of the prior art. On the other hand, in assessing the right to protection from unfair product copying, the proper object of attention is the actual marketplace design of and marketing practices for an allegedly copied product when compared

we are not in a position to verify or deny the correctness of the characterization of the district court, but do, out of deference to its proximity to the participants in argument below and because the matter has not been disputed by Cable, defer to its description of those arguments and presume the accuracy thereof for purposes of reaching our decision.



to those of the alleged copy. The aim of the patent system is to enhance the incentive for useful innovation; the aim of the Lanham Act, section 43(a), even in the context of product simulation, is to protect a trader's established identity. See *International Order of Job's Daughters v. Lindeburg & Co.*, 633 F.2d 912, 918-19, 208 USPQ 718, 724-25 (9th Cir.1980), *cert. denied*, 452 U.S. 941, 101 S.Ct. 3086, 69 L.Ed.2d 956 (1981) ("to protect consumers against deceptive designations of the origin of goods and, conversely, to enable producers to differentiate their products from those of others").

[19] In resolving the question of product design functionality for purposes of the Lanham Act, section 43(a), the fact finder is to consider the appearance of the *products* in issue. Reference to utility patent claims that are, or have been, asserted to read on either product, or to the appearance of the device depicted in figures included in the patent specification supporting such claims, must be done with caution. Cf. *Best Lock Corp. v. Schlage Lock Co.*, 413 F.2d 1195, 1199, 162 USPQ 552, 556, 56 C.C.P.A. 1472, 1477-78 (1969) (cautioning that "a utility patent is only 'some evidence' as to functionality" in its explanation of statements in *In re Shenango Ceramics, Inc.*, 362 F.2d 287, 292, 150 USPQ 115, 120, 53 C.C.P.A. 1268, 1274 (1966)). See also *In re Hollaender Manufacturing Co.*, 511 F.2d 1186, 1188, 185 USPQ 101, 102 (CCPA 1975); *In re Honeywell, Inc.*, 497 F.2d 1344, 1348, 181 USPQ 821, 824 (CCPA 1974). Claims may be capable of reading on many devices of strikingly different configuration. Thus, even the fact that the claims read on two commercial devices in the marketplace is not support in itself for a finding that one is a copy of the other or confusingly similar thereto for section 43(a) purposes. A manufacturer may choose in its commercial embodiment of a patented device to less than faithfully replicate the exemplary depiction of a claimed embodiment shown in the figures of the patent. Hence, for purposes of evaluating the existence or impact of product copying, the relevance of patent figures depends on

the extent to which their appearance is replicated in the actual marketplace product of the patentee. We have been shown no Ninth Circuit precedent to the contrary.

Concluding that the grant of summary judgment as to Cable's Lanham Act count was improper, we vacate that portion of the case and remand it for further proceedings consistent with the above discussions. To guide its analysis regarding functionality, the district court is to utilize the ample case law available from the Ninth Circuit.

#### B. State Causes of Action

[20] The two California State causes of action contained in Cable's amended complaint will be treated together below. In one, a count for unfair competition, it is charged that Genmark, desiring not to create its own original night light design, but rather to trade upon the good will reposed by the purchasing public in the configuration and packaging of Cable's night light, deliberately copied both. In the other state count, the use of the configuration chosen by Genmark for its night light is alleged to contribute to the dilution and to constitute infringement of Cable's rights in California State trademark registration number 70905, which is apparently substantially identical in appearance to that of Cable's night light.

The district court granted summary judgment as to both state causes, dismissing them for essentially the same reasons. 586 F.Supp. at 1508, 223 USPQ at 293. The state counts were said to present a "paradigm case" in which to apply the "established principles of federal preemption" of state-law intellectual property protection found in *Sears, Roebuck & Co. v. Stiffel Co.*, 376 U.S. 225, 84 S.Ct. 784, 11 L.Ed.2d 661, 140 USPQ 525, *reh'g denied*, 376 U.S. 973, 84 S.Ct. 1181, 12 L.Ed.2d 87 (1964), and *Compco Corp. v. Day-Brite Lighting, Inc.*, 376 U.S. 234, 84 S.Ct. 779, 11 L.Ed.2d 669, 140 USPQ 528, *reh'g denied*, 377 U.S. 913, 84 S.Ct. 1162, 12 L.Ed.2d 183 (1964). As an "alternative ground" for its decision, the district court relied on its conclusion mentioned above that the functionality of

Cable's product configuration was beyond dispute. That configuration was thus held not to be susceptible to protection under California law, either in the form of a registered state trademark, or as a product capable of being unfairly copied by competitors. *Id.* The error in the conclusion of the district court on functionality has already been addressed in relation to the Lanham Act count. Those same remarks are equally applicable to the dismissal of state causes of action. The discussion which follows will accordingly treat solely the issue of federal-state preemption.

### 1. Choice of Law

The Federal Circuit is vested with exclusive jurisdiction over the appeals of final decisions in cases before federal district courts only where the jurisdiction of those courts was based in whole or in part on the patent provisions of 28 U.S.C. § 1338. *See* 28 U.S.C. § 1295(a)(1).<sup>20</sup> In creating this nationwide subject matter jurisdiction in the area of patent appeals, it was the intention of Congress to provide a forum that would increase doctrinal stability in the area of patent law and reduce forum shopping, which was considered to be common in patent litigation.<sup>21</sup> Nevertheless, section 1295(a)(1) does not limit the jurisdiction of the Federal Circuit over appeals from the district courts exclusively to the review of claims based on the patent laws. When patent claims are joined in the same case with other counts, the appeal of nonpatent counts accompanies the appeal of the patent count to this court. In such "mixed cases" this avoids the bifurcation of ap-

peals between the Federal Circuit and the regional circuit to which appeals from the district court of nonpatent counts would otherwise be directed. *See* H.R.Rep. No. 312, 97th Cong., 1st Sess. 41 (1981), quoted and discussed in *Atari, Inc. v. JS & A Group, Inc.*, 747 F.2d 1422, 1435, 223 USPQ 1074, 1083-84 (Fed.Cir.1984) (in banc).

Congress recognized that this solution for reducing forum shopping in patent litigation and for avoiding bifurcated appeals, could through the joinder of frivolous patent causes of action, for example, "create forum shopping opportunities between the Federal Circuit and the regional courts of appeals on other [nonpatent] claims." S.Rep. No. 97-275, 97th Cong., 2d Sess. 20, reprinted in 1982 U.S.Code Cong. & Ad. News 11, 30. Several appropriate responses by the circuit courts were recommended. *Id.*

In due course it became apparent that even the joinder of nonfrivolous patent counts with other nonpatent causes of action creates a potential for forum shopping in the appeal of the nonpatent causes. Recognizing that the motivation for such appeal forum shopping resides in the perceived opportunity to secure on appeal the application in the nonpatent counts of law differing from that which would otherwise be used in the regional circuit, this court sitting in banc at its own initiative declared in *Atari*, 747 F.2d at 1440, 223 USPQ at 1087, its intention in the review of certain nonpatent matters to apply the "discernable law of the involved circuit" from which the appeal originated.<sup>22</sup>

20. *See supra* note 17.

21. For the legislative history of the statute creating the United States Court of Appeals for the Federal Circuit, the Federal Courts Improvement Act of 1982, Pub.L. No. 97-164, 96 Stat. 25, and the intention of Congress thereby to achieve this uniformity, *see* S.Rep. No. 97-275, 97th Cong., 2d Sess. 3-6, reprinted in 1982 U.S.Code Cong. & Ad.News 11, 13-16. Uniformity was also sought in federal personnel, government contract, and Little Tucker Act cases. 28 U.S.C. § 1295 (1982).

22. This general principle had already been specifically effected by various three-judge panels

of this court in reviewing specific procedural matters, *In re Medical Prosthetics Research Associates, Inc.*, 739 F.2d 618, 620 (Fed.Cir.1984); *W.L. Gore & Associates, Inc. v. International Medical Prosthetics Research Associates, Inc.*, 745 F.2d 1463, 223 USPQ 884 (Fed.Cir.1984); *Panduit Corp. v. All States Plastic Manufacturing Co.*, 744 F.2d 1564, 223 USPQ 465 (Fed.Cir.1984) (all concerning attorney disqualification), and specific substantive matters. *See American Hoist & Derrick Co. v. Sowa & Sons*, 725 F.2d 1350, 1366-67, 220 USPQ 763, 775-76 (Fed.Cir.), cert. denied, — U.S. —, 105 S.Ct. 95, 83 L.Ed.2d 41 (1984) (the necessity of showing relevant market to establish a section 2 Sherman

## 2. Preemption

Notwithstanding the fact that the Supreme Court has made several pronouncements on the interrelationship of the federal patent laws to state protection of intellectual property,<sup>23</sup> we conclude that the proper reach of the preemptive effect of the federal patent laws in relation to the diverse assortment of trade regulation laws existing in the fifty states is not a matter over which this court has a mandate to unify the law evolved in the regional circuits.

This issue is not one that can come before this court in the appeal of a case that was based at the district court level solely on the patent provisions of 28 U.S.C. § 1338(a). The federal-state preemption question is presented exclusively in state intellectual property causes of action. When a patent cause is joined with a state intellectual property cause of action in a single "mixed" case, and both causes are appealed, the issue of federal-state preemption can reach this court for review. In the absence of a patent count below, the appeal of the state action and the associated preemption issue will be resolved in the regional circuit. Thus, the correct application of the preemption principles voiced in *Sears* and *Compco* is a responsibility which is shared between this court and the regional circuits.

Act violation); *Bandag, Inc. v. Al Bolser's Tire Stores, Inc.*, 750 F.2d 903, 909, 223 USPQ 982, 986 (Fed.Cir.1984) (infringement of federally registered trademarks). All were cited in *Atari*, 747 F.2d at 1438-40, 223 USPQ at 1086-87, as having recognized the "freedom of the district courts to follow the guidance of their particular circuits in all but the substantive law fields assigned exclusively to this court."

23. In addition to the *Sears* and *Compco* cases already cited, see, e.g., *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 94 S.Ct. 1879, 40 L.Ed.2d 315, 181 USPQ 673 (1974); *Goldstein v. California*, 412 U.S. 546, 93 S.Ct. 2303, 37 L.Ed.2d 163, 178 USPQ 128, reh'g denied, 414 U.S. 883, 94 S.Ct. 27, 38 L.Ed.2d 131 (1973).

24. The district court supported its decision that preemption applies in this case exclusively with

[21] Consequently, under the guidance of *Atari*, when the preemption issue is reviewed in this circuit we will apply the law that has evolved in the regional circuit in which the case containing the issue was originally tried. Adopting this course will then assure that preemption is applied uniformly in the cases of a given regional circuit, whether they are appealed there or, by including a nonfrivolous patent cause of action, reviewed here. Such a rule will reduce the incentive for forum shopping with respect to a significant threshold issue in state causes of action.

## 3. Disposition

[22] Unfortunately, when it decided whether the state counts pled by Cable in this case were preempted by *Sears* and *Compco*, the district court did not look to the law of the Ninth Circuit for standards or methodology. This was understandable because at that time the gathering consensus of this court regarding the correct body of law under which to review certain nonpatent matters had yet to be announced in our decision in *Atari*.<sup>24</sup> Accordingly, neither the district court nor this one has had the benefit of any presentation by the parties on the issue of federal-state preemption in terms of the Ninth Circuit law which is proper to consult in this instance.<sup>25</sup>

Accordingly, the grant of summary judgment as to both state actions is vacated, and these counts are remanded for recon-

the authority of *Litton Systems, Inc. v. Whirlpool Corp.*, 728 F.2d 1423, 1448-49, 221 USPQ 97, 113 (Fed.Cir.1984). *Litton* not only preceded the *in banc* pronouncements on choice of law in *Atari*, but it held that preemption applied to a pair of Minnesota State causes of action without finding it necessary to address the choice of law issue. *Litton* did acknowledge the potential for a choice of law issue as to another nonpatent count there on appeal, a cause of action under section 43(a) of the Lanham Act, but explicitly refrained from resolving that choice in deciding the appeal. The correct body of law to apply in section 43(a) matters was determined subsequently in *Bandag, Inc. v. Al Bolser's Tire Stores, Inc.*, 750 F.2d 903, 909, 223 USPQ 982, 986 (Fed.Cir.1984), which was issued on the same day as *Atari*.

25. See *supra* note 18.

sideration by the district court in light of the *Atari* mandate to use local circuit law in doing so. This is done out of fairness to the litigants who should be able in our view to address the state causes in such terms before a decision is rendered. Nevertheless, we do so without making any suggestion as to what would be a correct resolution of the federal-state preemption issue when considered under the law of the Ninth Circuit.<sup>26</sup>

#### IV. CONCLUSION

The grant of summary judgment based on the invalidity of the Schwartz patent is affirmed. The grant of summary judgment as to the Lanham Act and the two California State causes of action is vacated. Those causes are remanded for such further proceedings as are rendered appropriate by this opinion.

The conduct of discovery in this case is returned to the sound discretion of the district court. It is free at the request of either party to reconsider or affirm any of its earlier discovery rulings based on the legal issues and factual areas of inquiry that it deems have relevance to this case in view of the above discussions.

**AFFIRMED-IN-PART, VACATED-IN-PART, AND REMANDED.**

#### APPENDIX

In Claim 1 of the Schwartz patent bracketed material and paragraphing have been added below:

1. A portable light-sensitive electrical device capable of being used with and movable between one or more of a number of spaced existing conventional electrical receptacles of the type normally found mounted in walls, or the like, comprising in combination:

[a.] a housing having front, rear, side, top and bottom wall portions,

[b.] an electrical circuit carried within said housing,

[c.] blade means electrically connected to said circuit with portions thereof extending from said housing for removably matingly engaging and being physically mounted to contacts of an electrical receptacle,

[d.] lamp-receiving socket means electrically cooperative with said circuit and whose substantially sole source of current is from said receptacle,

[e.] and light-sensitive means carried by said housing and disposed so as to be able to receive ambient light for controlling current flow from one of said receptacle contacts to said socket means, allowing more current flow to said socket means as ambient light received by said light-sensitive means decreases and lesser current flow to said socket means as said received light increases,

said device being characterized by the absence of need for a power source other than that to which it is connected and

wherein said housing does not cover the receptacle openings and surrounding receptacle portions of the unused receptacle of a duplex receptacle to which the device is connected,

said light sensitive means including a photo conductive cell,

said device [further] including

[i.] an electric light bulb with portions thereof mounted in said socket and

[ii.] a shade of predetermined shape and appearance,

said shade comprising front and side wall portions, said front wall portion having a generally planar surface extending between generally rectangular edges including longer vertically extending edges and relatively shorter horizontally extending edges, said side wall portions extending in a diverging manner general-

26. *But cf. Petersen Manufacturing Co. v. Central Purchasing, Inc.*, 740 F.2d 1541, 1550 n. 10, 222 USPQ 562, 569 n. 10 (Fed.Cir.1984), where a panel of this court stated in dicta that the Ninth Circuit precedent, *Tveter v. AB Turn-O-Matic*,

633 F.2d 831, 220 USPQ 22 (9th Cir.1980), held in effect that the state law trademark claim in *Petersen* was properly dismissed under *Sears and Compco*.

APPENDIX—Continued  
ly symmetrically at a predetermined angle greater than 90 degrees away from said front wall portion toward a rearward plane of said housing,

said shade being formed ... at said front wall portion with a generally polygonal-shaped pattern extending over substantially the entire front wall portion,

said shade further comprising bottom means capable of being swung inwardly to frictionally engage and disengage in a snap-on manner and be mounted to said housing in a position with respect to said housing illustrated in FIG. 1 of the drawing, said shade engagement and disengagement with said housing facilitating repeated replacement of said bulb.



USM CORPORATION, Appellant,

v.

SPS TECHNOLOGIES, INC., Appellee.

Appeal No. 84-1397.

United States Court of Appeals,  
Federal Circuit.

Aug. 12, 1985.

Action was brought against patent assignee alleging misuse, invalidity and non-infringement. In a supplemental complaint antitrust counterclaims were added but were severed for separate trial. The United States District Court for the Northern District of Illinois, 453 F.Supp. 743 dismissed invalidity and infringement counts based on res judicata and subsequently held that patent invalid for fraud on the Patent Office, 514 F.Supp. 213, and appeal was taken. The Court of Appeals for the Seventh Circuit, 694 F.2d 505 vacated the conclusion of fraudulent procurement. In proceedings on remaining claims the District Court, Nicholas J. Bua, J., rendered

summary judgment for defendant, and plaintiff filed appeal with the Court of Appeals for the Federal Circuit and defendant moved to transfer. The Court of Appeals for the Federal Circuit, Davis, Circuit Judge, held that the court would decline jurisdiction and would grant motion to transfer where the Seventh Circuit had finally adjudicated all patent issues.

Motion granted.

#### Federal Courts ⇐1145

Court of Appeals for the Federal Circuit declined to assume jurisdiction over appeal from order granting summary judgment for defendant on antitrust claim based on defendant's alleged fraud on Patent Office where the Seventh Circuit, to which appeal of issues involving alleged patent misuse, invalidity and noninfringement had been noticed prior to creation of the instant Court, had finally adjudicated all patent issues; all § 1338 patent claims had been finally adjudicated and instant appeal was wholly devoid of issues under § 1338, present or potential, and judicial efficiency favored resolution by the Seventh Circuit. 28 U.S.C.A. §§ 1295(a)(1), 1338, 1338(a).

Raymond P. Niro, Niro, Scavone, Haller and Niro, Ltd., Chicago, Ill., for appellant.

Timothy J. Haller, Niro, Scavone, Haller and Niro, Ltd., of Chicago, Ill., of counsel.

Leonard J. Santisi, Curtis, Morris & Sanford, of New York City, for appellee.

#### ON MOTION

Before DAVIS, BALDWIN, and NEWMAN, Circuit Judges.

#### ORDER

SPS, Technologies, Inc., (SPS) has moved to transfer this appeal to the United States Court of Appeals for the Seventh Circuit. We grant the motion and transfer the appeal.

The primary Section 103 issue<sup>16</sup> presented by the parties is whether it would have been obvious to one of ordinary skill in the art in October of 1963 \* \* \* to combine Jones or Gordon with Evans in such a way as to produce the concept claimed in Cole. While the fact that the Examiner apparently did not consider a prior art patent disclosing a digital character generator deprives the Cole patent of its presumption of validity, I nevertheless conclude that Cole is not obvious based on Evans in light of Jones or Gordon.

<sup>16</sup> As explained in an earlier footnote, I conclude that Cole, if not anticipated by Dirks, is obvious from Dirks in light of Brown et al. and others. See n. 6, supra. [558 F.Supp. at 952, 217 USPQ at 431.]

Footnote 6 merely states:

<sup>6</sup> The use of both sawtooth and staircase (or stepping) waveforms for vertical and horizontal deflection in CRTs was common prior to 1960, as evidenced by the Brown and Gordon patents. \* \* \* It was a matter of designers' choice. Thus, if Dirks is distinguishable on the basis of its stepping in a vertical direction, Cole was nevertheless obvious from the prior art and invalid under 35 U.S.C. § 103. [558 F.Supp. at 948, 217 USPQ at 428.]

This was the extent of the district judge's obviousness analysis that included a mention of Dirks.

The excerpts indicate that it is not clear whether the district judge relied on Dirks in his obviousness analysis.<sup>3</sup> While the text speaks of combining Evans, Jones and Gordon, footnote 15 states that Cole was obvious in light of Dirks and Brown. The district judge seemed to have either ignored Dirks in the obviousness analysis or believed that an anticipatory reference such as Dirks need not or could not be included in such analysis. The factfindings

3. Contrary to majority's belief that appellees alone contributed to the district court's confusion, RCA also contributed to that confusion. In a footnote on page 39 of its Post-Trial Brief, RCA stated:

As noted earlier, the inoperativeness of the foreign Dirks patents removes them from pos-

fail to disclose to us the steps by which the district judge reached his obviousness conclusion. See *Kelley, supra*; *Morow, supra*. It is confusing as to whether he relied on or ignored Dirks in the factfindings regarding the "differences" between Cole and the prior art references. See *Packer, supra*. Failure to explicitly include Dirks in factfindings regarding the "differences" so as to provide an appellate court with a clear understanding of the basis of the district court's obviousness determination is reversible error. See *Golf City, supra*; *United Shoe, supra*.



**LINDEMANN MASCHINENFABRIK  
GMBH, Appellant,**

v.

**AMERICAN HOIST AND DERRICK  
COMPANY, Harris Press and Shear Di-  
vision, Commercial Metals Company,  
Appellees.**

No. 83-1178.

United States Court of Appeals,  
Federal Circuit.

March 21, 1984.

Assignee of patent No. 3,945,315 on hydraulic scrap shears brought action for infringement of certain claims of patent, and defendant counterclaimed for declaration that patent was invalid. The United States District Court for the Southern District of Texas, Ross N. Sterling, J., held patent claims invalid, and assignee appealed. The Court of Appeals, Markey, Chief

sible consideration as anticipatory references, \* \* \* and from consideration as to the obviousness of the Cole patent \* \* \*.

In addition, RCA, on page 18 of the same Post-Trial Brief, acknowledged HLA's arguments at trial regarding the obviousness of the Cole invention in light of Dirks.

**LINDEMANN MASCHINENFABRIK v. AM. HOIST AND DERRICK 1453**

Cite as 730 F.2d 1452 (1984)

Judge, held that: (1) finding that inventions set forth in patent claims were anticipated by prior patent was clearly erroneous; (2) finding that inventions set forth in claims would have been obvious was clearly erroneous; (3) district court erred in concluding that patent specification was nonenabling; and (4) action was properly remanded for determination on infringement issue.

Reversed and remanded.

**1. Patents ⇨314(2)**

In action challenging validity of patent, trial court's role in relation to patentability does not require it to conclude whether something was or was not "invented," or whether court subjectively considers invention "worthy" of patent protection; court's role is simply to determine whether patent's challenger carried burden of establishing invalidity. 35 U.S.C.A. § 282.

**2. Federal Courts ⇨850**

While source of findings does not render "clearly erroneous" standard any less applicable or binding on appellate review, apparent absence of trial court's personal attention need not be disregarded. Fed. Rules Civ.Proc.Rule 52(a), 28 U.S.C.A.

**3. Federal Civil Procedure ⇨2280**

Where adopted findings of fact are those proposed by party before trial, greater chance is created that those findings may be clearly erroneous. Fed.Rules Civ. Proc.Rule 52(a), 28 U.S.C.A.

**4. Federal Courts ⇨752**

While Court of Appeals reviews judgments, not rhetoric in opinions, language in opinion, or in set of findings and conclusions, may indicate that numerous harmful errors of law produced erroneous conclusion and that decisional approach of district court led to judgment not supported in law by facts of record.

**5. Patents ⇨324.55(2)**

In action challenging validity of patent, anticipation is factual determination, reviewable under "clearly erroneous" stan-

dard. 35 U.S.C.A. § 102(b); Fed.Rules Civ. Proc.Rule 52(a), 28 U.S.C.A.

**6. Patents ⇨72(1)**

Anticipation of patent requires presence in single prior art reference disclosure of each and every element of claimed invention, arranged as in claim. 35 U.S.C.A. § 102(b).

**7. Patents ⇨72(1)**

In deciding issue of anticipation, trier of fact must identify elements of claims, determine their meaning in light of specification and prosecution history, and identify corresponding elements disclosed in allegedly anticipating reference. 35 U.S.C.A. § 102(b).

**8. Patents ⇨312(6)**

In action challenging validity of patent on hydraulic scrap shears, finding that inventions set forth in certain claims of patent were anticipated by prior patent was clearly erroneous, where district court's analysis treated claims as mere catalogues of separate parts, in disregard of part-to-part relationships which gave claims their meaning. 35 U.S.C.A. § 102(b).

**9. Patents ⇨112.1**

Burden upon challenger of validity of patent is to introduce evidence of facts establishing invalidity, thus overcoming presumption of validity, and that evidence, if it is to carry the day, must be clear and convincing. 35 U.S.C.A. § 282.

**10. Patents ⇨112.1**

In action challenging validity of patent, trial court erred in ruling that introduction of nonconsidered art weakened or eliminated statutory presumption of validity, and in adjusting required level of proof downward to "mere preponderance"; that clear and convincing standard may more easily be met when such nonconsidered art is more pertinent than cited art meant that determination of whether patent challenger had met its burden turned on relationship of uncited art to claimed invention. 35 U.S.C.A. § 282.

**11. Patents ⇨312(1½)**

To extent that examiner's consideration of uncited art is material in action challenging validity of patent, burden is on challenger to show that prior art had not been considered; challenger meets that particular burden by showing that uncited art is more relevant than that cited, just as patentee defeats uncited art by showing that its relevancy is equal to or less than that cited. 35 U.S.C.A. § 282.

**12. Patents ⇨112.1**

Though courts, in determining validity of patent, will give due respect to examiner's evaluation of prior art, they are not bound thereby.

**13. Patents ⇨36.2(1)**

In action challenging validity of patent, district court improperly discounted weight due evidence of commercial success because that success occurred abroad; showing of commercial success of claimed invention, wherever such success occurs, is relevant in resolving issue of nonobviousness. 35 U.S.C.A. § 103.

**14. Patents ⇨16(1)**

Having concluded in action challenging validity of patent that claimed invention would have been obvious from prior art, district court erred in looking only to see whether showing of commercial success was so overwhelming as to overcome that conclusion; all evidence must be considered before conclusion on obviousness is reached. 35 U.S.C.A. § 103.

**15. Patents ⇨36(1)**

In action challenging validity of patent, evidence of unexpected results may be strong support for conclusion of nonobviousness. 35 U.S.C.A. § 103.

**16. Patents ⇨26(1)**

Fact that patent specifically stated that it disclosed and claimed combination of features previously used in two separate devices is not fatal to patentability; claimed invention must be considered as a whole, and question is whether there is something in prior art as a whole to sug-

gest desirability, and thus obviousness, of making combination. 35 U.S.C.A. § 103.

**17. Patents ⇨36(3)**

In action challenging validity of patent on hydraulic scrap shears, district court's finding that inventions set forth in certain claims of patent would have been obvious was clearly erroneous, where nothing in prior art relied on as invalidating had any relation to crushing of massive metal scrap which was distinguishing feature of shears. 35 U.S.C.A. § 103.

**18. Patents ⇨99, 314(5)**

In action challenging validity of patent, enablement is legal issue, and question is whether disclosure is sufficient to enable those skilled in art to practice claimed invention, and thus specification need not disclose what is well known in art. 35 U.S.C.A. § 112.

**19. Patents ⇨312(6)**

In action challenging validity of patent on hydraulic scrap shears, finding that patent was nonenabling because it did not disclose hydraulic and electrical system for controlling operation of rams was clearly erroneous, in light of unchallenged evidence establishing that hydraulic and electrical systems for metal scrap shears were well known to those skilled in art. 35 U.S.C.A. § 112.

**20. Patents ⇨323.1**

District court should decide validity and infringement and should enter judgment on both issues when both are raised in same patent proceeding.

**21. Patents ⇨324.60**

Where district court, in action on validity and infringement of patent, merely stated in record that patent had probably been infringed, but made no finding and entered no judgment on infringement, case was properly remanded.

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David Toren, New York City, argued, for appellant. With him on brief was Jules Goldberg, New York City.



# LINDEMANN MASCHINENFABRIK v. AM. HOIST AND DERRICK 1455

Cite as 730 F.2d 1452 (1984)

Michael E. Macklin, Houston, Tex., argued, for appellees. With him on brief was Edward W. Goldstein, Houston, Tex.

Before MARKEY, Chief Judge, COWEN, Senior Circuit Judge, and BENNETT, Circuit Judge.

MARKEY, Chief Judge.

Appeal from the May 23, 1983, judgment of the District Court for the Southern District of Texas, sitting without a jury and holding invalid claims 1, 2, and 4 of appellant's (Lindemann's) U.S. Patent No. 3,945,315 issued March 23, 1976 and entitled "Hydraulic Scrap Shearing Machine". We reverse and remand.

## BACKGROUND

### *The Patent*

United States Patent No. 3,945,315 ('315) issued March 23, 1976 on an application filed April 16, 1975. Peter Dahlem and Hubert Milles are named co-inventors and Lindemann is listed as the assignee. The '315 patent claims a priority filing date, under 35 U.S.C. § 119, of May 13, 1974, based on West German application 2423003.

Hydraulic scrap shears, the subject matter of the '315 patent, are a principal tool of the scrap metal industry. The shears are large, often weighing several hundred tons, and are designed to cut scrap metal into smaller, uniform pieces for recycling.

There are two basic types of metal processed in the shears: "peddler's scrap" and "rigidly massive scrap".

Peddler's scrap consists of light to medium gauge metal objects, such as light tubing, automobile bodies, and window frames. It makes up a large percentage of the available scrap and is comparatively easy to process.

Rigidly massive scrap consists of heavy gauge metal objects, such as boilers, oil

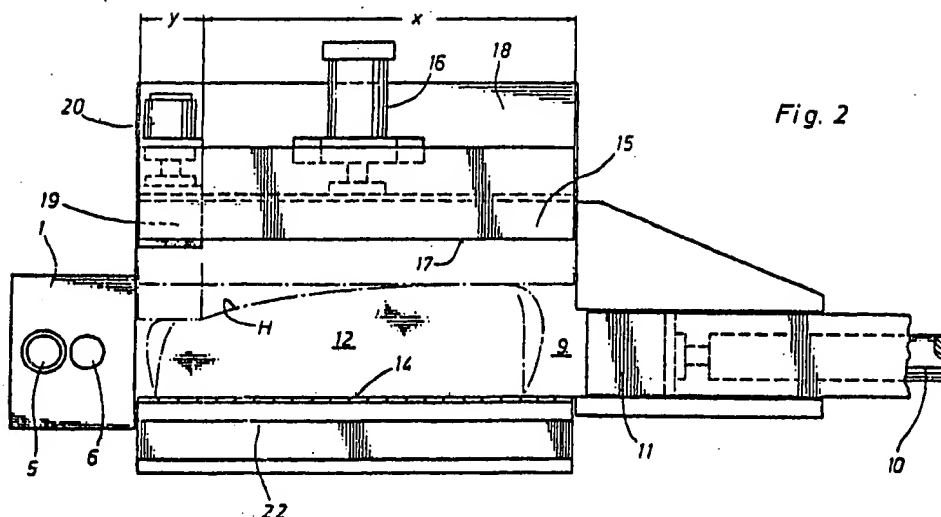
tanks, and railroad cars. Because of thickness or internal reinforcements, massive scrap objects are difficult to process. Traditionally, massive scrap had been processed in very large, tremendously powerful shears, or had been pretreated, e.g., with oxyacetylene torches, to reduce its size or weaken its internal reinforcements. Either approach was costly and time-consuming. Many scrap dealers handled peddler's scrap exclusively.

### *The Invention*

The '315 patent contains five claims. Claim 1, the only independent claim, is written in Jepson form:

1. In a hydraulic scrap-shearing machine comprising an open feed channel having two opposing side walls, scrap shears at one end of said feed channel and having a mouth narrower than the normal width of said feed channel between said side walls, hydraulic means for moving at least one of said side walls towards the other of said side walls whereby scrap placed in said feed channel can be squashed to a final width no greater than the width of said mouth of said scrap shears, and a feeder ram for pushing scrap along said feed channel into said mouth of said scrap shears, the improvement consisting of said movable one of said side walls being divided into two longitudinal portions of different lengths, and said hydraulic means comprising a main hydraulic ram having a working face forming the longer portion of said movable side wall, and an auxiliary hydraulic ram having a working face forming the shorter portion of said movable side wall just upstream of said mouth of said scrap shears, said auxiliary hydraulic ram being capable of operation independently of said main hydraulic ram.

The claimed structure is shown in Figure 2 of the '315 patent:



In operation, the combined rams (17, 19) advance into the feed channel (9), crushing and compacting the scrap (12) against the other, non-movable sidewall (14). With peddler's scrap, the two rams move the entire distance together. However, when the channel contains rigidly massive scrap, such as shown at (12), the two rams are quickly brought to a standstill by the scrap's resistance to crushing. The auxiliary ram (19) is then moved forward independently of the main ram (17). The auxiliary ram, having a smaller working surface than the combined rams, is capable of applying a greater crushing force to the scrap. The auxiliary ram cracks and buckles the scrap directly in front of it to crush the leading end of the scrap so it can be pushed through the mouth of the shears. That action also propagates that effect to an adjacent area (H) of the scrap. The structural integrity of the scrap is thus overcome by the auxiliary ram, thereby reducing the resistance of the portion of the scrap in contact with the main ram, allowing both rams to continue forward to crush the scrap to a width less than that of the shear mouth. The feeder ram (11) then pushes the crushed scrap through the mouth of the shear and under the shear blades (at 5) and clamp (at 6). The clamp

holds the crushed scrap in place during cutting.

The claimed invention allows one machine of moderate size to process both peddler's and rigidly massive scrap, and to do so quickly, inexpensively, and without the need for pre-treating massive scrap. Unchallenged testimony described crushing accomplished in minutes of scrap that would have required hours to crush in earlier larger machines and that could not have been crushed without pretreatment.

#### *District Court Proceedings*

On October 5, 1980, Lindemann sued appellees (collectively "Amhoist") for infringement of claims 1, 2, and 4 of the '315 patent. Amhoist asserted non-infringement and counterclaimed for a declaratory judgment that the '315 patent is invalid.

A three day trial was conducted on June 21-23, 1982. On May 23, 1983, the district court entered FINDINGS OF FACT AND CONCLUSIONS OF LAW, the introduction of which stated:

After hearing all the evidence the Court concludes that the patent is invalid. Plaintiff simply incorporated two admittedly well-known metal compression features in the same machine and sought to gain a monopoly in the use of knowledge

that had previously existed in the public domain. The Court finds and concludes that the claimed invention of the Plaintiff does not meet the statutory or constitutional requirements established for patent protection. Specifically, the machine was an obvious aggregation of prior art which produced no new or synergistic result. It failed materially to promote the progress of science and the useful arts.

The district court entered 60 findings and 20 conclusions indicating its view that the '315 patent is invalid under 35 U.S.C. § 102(b), 35 U.S.C. § 103, and 35 U.S.C. § 112.

[1] On May 24, 1983 the district court entered judgment declaring the '315 patent invalid. The judgment is silent respecting infringement, though the district court had stated from the bench at end of trial:

Well, if the '315 patent is valid, I think the proof is clear that it has been infringed and it is pretty clear that it was done with knowledge, conscious knowledge to the point of willful infringement.'

#### Issues

I. Whether the district court erred in finding the inventions set forth in claims 1, 2, and 4 anticipated by U.S. Patent 3,763,770 ('770) under 35 U.S.C. § 102(b).

II. Whether the district court erred in concluding that the inventions set forth in claims 1, 2, and 4 would have been obvious under 35 U.S.C. § 103.

III. Whether the district court erred in concluding that the '315 patent specifica-

1. The district court stated at the same time, "But I am not certain in my own mind at this point whether or not these gentlemen on the '315 patent invented anything". The statement reflects a misconception of the role of the courts under 35 U.S.C. § 103. The question mandated by statute is not "invention"; it is *patentability*. See *Rich, Escaping the Tyranny of Words—Is Evolution in Legal Thinking Impossible?*, 60 JPOS 71, May-June/APLA Bull. 237 (1978).

Moreover, the court's role in relation to patentability does not require it to conclude wheth-

tion was non-enabling under 35 U.S.C. § 112.

IV. Whether this court on remand should order entry of a judgment that claims 1, 2, and 4 were infringed by Amhoist.

#### OPINION

[2, 3] Of the district court's 60 findings, 57 were those submitted by Amhoist before trial. The source of findings does not render the "clearly erroneous" standard of Fed.R.Civ.P. 52(a) any less applicable or binding. *Rosemount, Inc. v. Beckman Instruments, Inc.*, 727 F.2d 1540, n. 4 (Fed. Cir.1984). In adhering firmly to that rule, however, an apparent absence of personal attention need not be disregarded. See *Amstar Corporation v. Domino's Pizza, Inc.*, 615 F.2d 252, 258, 205 USPQ 969, 974 (5th Cir.1980), *Wilson v. Thompson*, 593 F.2d 1375, 1384 n. 16 (5th Cir.1979). Under such circumstances, one court has indicated that strict scrutiny is appropriate. See *Smith International, Inc. v. Hughes Tool Co.*, 664 F.2d 1373, 215 USPQ 592 (9th Cir.1982). Where, as here, the adopted findings are those proposed by a party *before trial*, a greater chance is created that those findings may be clearly erroneous. Indeed, the present findings include some for which no supporting evidence was submitted at trial.

Having written them, Amhoist argues strenuously for retention of the findings behind the shield of the "clearly erroneous" rule, and repeatedly reminds us of our duty to review the findings favorably and of the burden resting on the appellant.

er something was or was not "invented", or whether the court subjectively considers the invention "worthy" of patent protection. The court's role is actually more simple. Under the statute, it is to determine whether the patent's challenger carried the burden of establishing invalidity. 35 U.S.C. § 282. See *Environmental Designs, Ltd. v. Union Oil Co. of Cal.*, 713 F.2d 693, 218 USPQ 865 (Fed.Cir.1983), *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed.Cir.1983), *Rosemount, Inc. v. Beckman Instruments*, 727 F.2d 1540 (Fed.Cir.1984).

However salutary, the rules governing review do not envision an appellate court shirking its duty to reverse an appealed judgment that is clearly based on legal error and unsupported by evidence in the record.

[4] We review judgments, not the rhetoric in opinions. Nonetheless, the language in an opinion, or in a set of findings and conclusions, may indicate that numerous harmful errors of law produced an erroneous conclusion, and that the decisional approach of the district court led to a judgment not supported in law by the facts of record. That happened here.

#### I. Anticipation

[5] Anticipation is a factual determination, reviewable under the "clearly erroneous" standard. *Carman Industries Inc. v. Wahl and Vibra Screw Inc.*, 724 F.2d 932 (Fed.Cir.1983), *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 218 USPQ 781 (Fed. Cir.1983), F.R.C.P. 52(a). "A finding is 'clearly erroneous' when although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed". *United States v. U.S. Gypsum Co.*, 333 U.S. 364, 395, 68 S.Ct. 525, 542, 92 L.Ed. 746, 76 USPQ 430, 444 (1948); *SSIH Equip. S.A. v. USITC*, 718 F.2d 365, 381, 218 USPQ 678, 692 (Fed.Cir. 1983).

[6, 7] Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed.Cir.1983); *SSIH Equip. S.A. v. USITC*, 718 F.2d 365, 218 USPQ 678 (Fed.Cir.1983). In deciding the issue of anticipation, the trier of fact must identify the elements of the claims, determine their meaning in light of the specification and prosecution history, and identify corresponding elements disclosed in the alleged-

ly anticipating reference. *SSIH, supra*; *Kalman, supra*.

[8] Lindemann contends the district court's finding on anticipation is clearly erroneous and we agree.

The finding of anticipation rested on a series of mistakes. The two gags of the '770 patent do not correspond to "said sidewall being divided into two portions of different lengths". The gags are beyond the end of the wall and constitute no part of a feed channel sidewall as claimed. The court found the '770 patent's magazine corresponded to the claimed "open feed channel having two opposing walls", but the "movable" wall of the magazine is movable only to adjust the magazine's width and not, as the claim requires, to crush scrap. Moreover, the findings that the magazine is the feed channel and that the gags are parts of a sidewall of the channel contradict each other. Nor does the shear anvil of the '770 patent, as the court stated, correspond to the "opposite sidewall" of the claim. Nor do the cylinder assemblies of the '770 patent move one sidewall of a feed channel toward the other as the claims require. Nor are the '770 patent's cylinder and gag (equated by the court to the claimed auxiliary ram) located "just upstream of said mouth". They are within the shear area and are thus downstream from where a mouth narrower than the feed channel would be if the '770 patent disclosed such a mouth, which it does not. Similarly, the other cylinder and gag of the '770 patent do not form a "longer portion of said movable sidewall". Nor can the channel that receives rod cuttings after shearing be equated, as did the district court, with the shear mouth claimed.<sup>2</sup>

The '770 patent discloses an entirely different device, composed of parts distinct from those of the claimed invention, and operating in a different way to process different material differently. Thus there is presented here no possible question of

2. Amhoist says Lindemann's Australian counsel "conceded" that the '770 patent cited by the Australian examiner was a "paper anticipation". The assertion is meaningless. First, the '315

patent's counterpart issued in Australia. Second, the language and laws of other countries differ substantially from those in the United States.

anticipation by equivalents. See *Tate Engineering, Inc. v. United States*, 477 F.2d 1336, 1342, 193 Ct.Cl. 1088, 175 USPQ 115, 119 (Ct.Cl.1973). It is clear, moreover, that the device disclosed in the '770 patent, had it come after issuance of the '315 patent, could not be found an infringement of the asserted claims. The district court's analysis treated the claims as mere catalogs of separate parts, in disregard of the part-to-part relationships set forth in the claims and that give the claims their meaning.

On the unchallenged evidence of record, we are left with a "definite and firm conviction" that the district court's finding of anticipation was mistaken and therefore clearly erroneous. That part of its judgment relating to invalidity under 35 U.S.C. § 102(b) must therefore be reversed.

## II. Obviousness

### A. Presumption of Validity

Guided by remarks found in then applicable court opinions, the district court: (1) viewed the statutory presumption of validity, 35 U.S.C. § 282, as "vanished" or "severely weakened" when Amhoist introduced prior art not cited by the examiner; (2) reduced the required burden of proof, in light of that introduction, to a "mere preponderance";<sup>3</sup> and (3) implicitly required Lindemann to prove that the uncited art had been considered by the PTO.

(1) Courts are not, of course, at liberty to repeal a statute, or to legislate conditions diminishing its effect. Hence the statutory presumption cannot "vanish" or be "weakened" and the statutorily assigned burden of proof cannot be shifted. *Stratoflex Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed.Cir.1983). At the same time, much confusion can be avoided by patentees who refrain from efforts to expand the role of the presumption

beyond its burden-assigning and decisional approach-governing function.

[9,10] (2) The burden upon the challenger of validity under 35 U.S.C. § 282 is to introduce evidence of facts establishing invalidity (thus overcoming the presumption). *American Hoist & Derrick Company v. Sowa & Sons, Inc.*, 725 F.2d 1350 (Fed.Cir.1984). That evidence, if it is to carry the day, must be clear and convincing. *Radio Corp. v. Radio Laboratories*, 293 U.S. 1, 55 S.Ct. 928, 78 L.Ed. 1453 (1934). Because the mere introduction of non-considered art (a common phenomenon) does not "weaken" or otherwise affect the presumption, there is no basis for adjusting the required level of proof downward to a "mere preponderance". That the clear and convincing standard may more easily be met when such non-considered art is more pertinent than the cited art means that determination of whether the patent challenger has met its burden turns on the relationship of the uncited art to the claimed invention. *Stratoflex, supra*; *Railroad Dynamics Inc. v. A. Stucki Co.*, 727 F.2d 1506 (Fed.Cir.1984), *Solder Removal v. USITC*, 582 F.2d 628, 199 USPQ 129 (CCPA 1978).

(3) Similarly, the parties have devoted much unnecessary argument to the question of whether Lindemann is entitled to a presumption that the examiner had considered the uncited art because it is found in the classes and subclasses searched by the examiner (and because, as Lindemann says, the examiner had cited that art in examining an earlier application). Authorities are cited on both sides.<sup>4</sup>

[11,12] Because the touchstone is whether the uncited art is sufficiently more relevant than that cited to serve as evidence of obviousness, argument respecting

3. The district court in a conclusion of law also stated that "under any burden of persuasion the '315 patent is invalid because of obviousness". As indicated in the text, we disagree.

4. The district court indicated the view that "the 'Field of Search' is exactly what it purports to be and nothing more, that 'References Cited' are

the patents found within the field which were actually considered by the examiner and listed because he found them to be most relevant". That view is flawed. The examiner could not determine which patents are "most relevant" without considering a number which are less relevant.

a presumption based on the uncited art's classification is pointless. The argument here, moreover, appears to have led to the erroneous view that Lindemann bore the burden of proving that the uncited art had been considered. To the extent that the examiner's consideration of uncited art is material, the burden is on the challenger to show that "that prior art" had *not* been considered." *Richdel Inc. v. Sunspool Corp.*, 714 F.2d 1573, 219 USPQ 8 (Fed.Cir. 1983). The challenger meets that particular burden by showing that the uncited art is more relevant than that cited, just as the patentee defeats the uncited art by showing that its relevancy is equal to or less than that cited.<sup>5</sup>

**B. Scope and Content of the Prior Art**<sup>6</sup>

"The scope of the prior art has been defined as that 'reasonably pertinent to the particular problem with which the inventor was involved'." *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1535, 218 USPQ 871, 876 (Fed.Cir.1983) (and cases cited therein). The district court defined the problem here broadly, i.e., as the problem of compressing waste materials. That finding is clearly erroneous. The inventors' problem was the crushing of massive metal scrap. Nothing in the prior art relied on as invalidating had any relation whatever to the crushing of massive metal scrap.

Lindemann attempts too much in arguing that waste compactors are non-analogous. Though the problems differ, both parties manufacture both products and both are exhibited at the same trade shows. Art that is analogous may or may not render a claimed invention obvious. As indicated below, it does not do so here.

5. Though the courts will give due respect to the examiner's evaluation of prior art, they are not of course bound thereby. Patentees desiring the benefit of the examiner's evaluation of originally uncited art have available the reexamination procedures under 35 U.S.C. §§ 301-307. Those procedures were not employed in this case.

6. The level of skill is not of record and is not discussed in the briefs.

The content of the prior art discussed in Amhoist's brief is that disclosed in the '770 patent (discussed above) and in British Patent No. 1,230,014 ('014).<sup>7</sup>

The '014 patent discloses a compactor for particulate waste, e.g., garbage. The loose waste is pressed into the wide mouth of a funnel by a circular plate. The smaller end of the funnel communicates with a container to receive the compacted waste. A small finger-like ram is coaxial with, and normally moves with, the plate. When the material fills the funnel so tightly that the plate can add no more, the separately operable small ram can be advanced ahead of the main ram and into the waste material. The small ram has a diameter smaller than that of the funnel outlet. When the small ram has pressed a core of waste material through the funnel outlet, the remaining waste material is loosened and additional waste material may then be pressed into the funnel by the plate and ram working together.

In a conclusion of law, the district court stated that it had considered the facts in light of the inquiries mandated by *Graham v. John Deere & Co.*, 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545, 148 USPQ 459 (1966), and that a strong indication supporting its conclusion of obviousness was "the fact that three individuals independently created the designs which resulted in development of the split ram shears which are the subjects of this lawsuit". Because the statute, 35 U.S.C. § 135, (establishing and governing interference practice) recognizes the possibility of near simultaneous invention by two or more equally talented inventors working independently, that occurrence may or may not be an indication of obviousness when considered in light of all the circumstances. See *E.I. DuPont de*

7. The district court additionally discussed the S-501 shear produced by Amhoist and incorporating a tapered feed channel with a single side ram about one foot from the shear mouth. Amhoist correctly recognizes on appeal the absence of need to discuss the S-501 shear.

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*Nemours & Co. v. Berkley & Co.*, 620 F.2d 1247, 205 USPQ 1 (8th Cir.1980). In this instance, it clearly is not. Two of the three individuals were Dahlem and Milles, the co-inventors listed on the '315 patent. The third was an Amhoist employee who claimed at trial to have proposed the split ram in January of 1979, more than five years after the invention was made by Lindemann's assignors, nearly three years after the '315 patent issued, and well after Amhoist's employee Bleeland had in England observed and photographed a Lindemann shear embodying the claimed invention. Accepting, as we must, the district court's crediting of the testimony respecting independent suggestion by an Amhoist employee, that suggestion was simply too late to have been relevant to a determination of whether the invention would have been obvious at the time it was made, 35 U.S.C. § 103, which was more than five years earlier.

C. Commercial Success.

[13] The district court improperly discounted the weight due the evidence of commercial success because that success occurred abroad. A showing of commercial success of a claimed invention, wherever such success occurs, is relevant in resolving the issue of non-obviousness. *Weather Engineering Corp. v. United States*, 614 F.2d 281, 222 Ct.Cl. 322, 204 USPQ 41 (1980).

[14] The evidence at trial showed that the claimed invention accounted for 30% of Lindemann's total sales worldwide for a total sales price of over \$20,000,000 (30 machines at approximately \$667,000 each). The district court correctly stated that commercial success cannot by *itself* establish nonobviousness. However, having concluded that the claimed invention would have been obvious from the prior art, the court looked only to see whether the showing of commercial success was so overwhelming as to overcome that conclusion. That was error. All evidence must be considered *before* a conclusion on obviousness is reached. *Stratoflex, Inc. v. Aeroquip*

*Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir.1983), *Kansas Jack, Inc. v. Kuhn*, 719 F.2d 1144, 219 USPQ 857 (Fed.Cir.1983), *W.L. Gore & Associates v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303, 314 (Fed.Cir. 1983). The commercial success here shown is evidence that the claimed invention was not obvious to those who paid  $\frac{2}{3}$  of a million dollars for each machine to escape the previously perceived need for pretreatment of massive scrap.

D. Unexpected Results

[15] The district court ignored the unexpected or surprising results achieved by the claimed invention. Though no requirement for such results is present in the statute, 35 U.S.C. § 103, *Chore-Time Equipment, Inc. v. Cumberland Corp.*, 713 F.2d 774, 218 USPQ 673 (Fed.Cir.1983), evidence of unexpected results may be strong support for a conclusion of nonobviousness. *Kansas Jack, Inc. v. Kuhn*, 719 F.2d 1144, 219 USPQ 857 (Fed.Cir.1983).

Neither the district court nor Amhoist's brief on appeal has a word to say about the unexpected results asserted by Lindemann, namely, the rapid crushing of rigidly massive scrap in a moderate sized scrap shear without pretreatment. That the claimed inventions achieve those results is unchallenged. Neither the district court nor Amhoist suggest anything in any piece of prior art, or in the prior art as a whole, that would lead one skilled in the art to expect achievement of such results.

The record is clear that no earlier shears of any size, and no prior art device of any type could economically process rigidly massive scrap without pretreatment. Unchallenged testimony of experts was characterized by surprise and amazement that the claimed invention was able to accomplish that feat. That it could do so in minutes, and with a moderate sized structure, were further sources of surprise. That those skilled in the art had previously believed pretreatment of rigidly massive scrap was required was also uncontradicted.

It is further clear from the uncontradicted evidence that the claimed invention achieved new and unexpected results nowhere suggested in the prior art, and that the district court overlooked the effect of that achievement in reaching its determination of obviousness. In so doing, the district court erroneously focussed its inquiry "solely on the product created, rather than on the obviousness or nonobviousness of its creation". *General Motors Corp. v. U.S. International Trade Commission*, 687 F.2d 476, 482-83, 215 USPQ 484, 489 (CCPA 1982).

The district court viewed the claimed invention as merely the "aggregation" of two different sized rams. Finding the first in one place in the prior art and the second in another place, the district court entered this conclusion:

Plaintiff simply put the two features in the same machine and connected them as was necessary depending on whether the scrap was small or large. It used a known connection idea. The '315 machine possessed one known feature to operate in a known way to produce a known result to deal with the first scrap situation and another known feature operating in a known manner to produce a known result to deal with the second. Clearly, this was an obvious solution using already appreciated or obvious features to solve the problem of how to develop a machine that could handle both types of scrap most economically.

[16] The '315 patent specifically stated that it disclosed and claimed a combination of features previously used in two separate devices. That fact alone is not fatal to patentability. The claimed invention must be considered as a whole, and the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination. *In re Imperato*, 486 F.2d 585, 179 USPQ 703 (CCPA 1973); *In re Sernaker*, 702 F.2d 989, 217 USPQ 1 (Fed. Cir.1983). That question must here be answered in the negative.

Nothing in the references alone or together suggests the claimed invention as a solution to the problem of crushing rigidly massive scrap. There was nothing whatever of record, therefore, to support the district court's statement that the claimed machine possessed "another known procedure operating in a known manner to produce a known result" or its conclusion that Lindemann "knew ... that a small sidewall ram could most economically process large scrap".

The '014 patent deals only with soft, easily compactible, particulate material. Though that patent discloses a two-ram structure and the principle that loose material when too tightly compacted can be loosened by injection of a thin ram into the material, the claims here are not drawn to the mere concept of two differently sized rams, or to the known principles governing the effects of large and small rams (or to the propagation of force principle discussed at trial). That the claimed invention may employ known principles does not in itself establish that the invention would have been obvious. Most inventions do. Nothing in the '014 patent would suggest that rigidly massive scrap could be rapidly and economically crushed and sheared without pretreatment.

The '770 patent, as above indicated, deals only with holding brittle material within a shear by compression. Nothing in the '770 patent suggests that making the crushing wall of a metal scrap shear in two independently operable parts, with a smaller part adjacent the mouth of the shears, would enable the crushing of massively rigid scrap without pretreatment.

Nothing, moreover, in the '014 or '770 patents adds anything to the prior art considered by the examiner. As above indicated, the '315 specification itself recognized the separate presence in the prior art of feed channels with one solid moveable crushing wall and of feed channels with a small ram in one of two fixed sidewalls. The examiner cited as "of interest" the Pioch patent which, like the '014 patent,



disclosed two independently operable pushers in a waste compactor.

[17] Applying the standard of Rule 52(a), Fed.R.Civ.P., we are persuaded that the findings underlying the district court's conclusion of obviousness are clearly erroneous. Further, that conclusion resulted from errors of law in interpreting the claims and in consideration and application of the prior art. That part of the appealed judgment relating to 35 U.S.C. § 103 must therefore be reversed.

### III. Enablement

The district court concluded that the '315 patent was non-enabling because it did not disclose a hydraulic and electrical system for controlling the operation of the rams.

[18] Enablement is a legal issue. *Raytheon Co. v. Roper Corp.*, 724 F.2d 951 (Fed.Cir.1983). The question is whether the disclosure is sufficient to enable those skilled in the art to practice the claimed invention, hence the specification need not disclose what is well known in the art. *In re Myers*, 410 F.2d 420, 161 USPQ 668 (CCPA 1969).

The unchallenged evidence of record establishes that hydraulic and electrical systems for metal scrap shears were well known to those skilled in the art, and that the selection and connection of the elements of such systems was simply a matter of plumbing.

Amhoist points to testimony relating to 800 man hours it expended in developing its split ram shear. It also points to the dismantling of the accused machines by its two customers, whereby the rams are operated together as one sidewall and asserts that the split ram structure of the claimed invention has thus been abandoned by those customers.<sup>8</sup> There is no evidence indicating that the dismantling was due to difficulty in designing a suitable hydraulic-electric control system.

8. The record does not reflect the rationale underlying a vigorously fought lawsuit and its accompanying expense in the light of two sales

It is clear that no undue experimentation was required in practicing the claimed invention. *W.L. Gore & Assoc. Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1557, 220 USPQ 303, 316 (Fed.Cir.1983). Amhoist spent approximately 100 more hours than did Lindemann in designing the entire split ram shear, including the hydraulic-electric control system. There was no evidence of the amount of time needed to develop the control system itself. Of the total time Amhoist spent on developing its shear, it devoted an undisclosed amount attempting to create a "hydraulically operated pin" to connect the two rams. That pin was unnecessary. The '315 patent's specification discloses a simple mechanical pin to achieve the same connection. Further, Amhoist conceded at oral argument that nothing in the claims fails of enablement in the specification.

[19] The district court erred in its conclusion that the '315 patent specification is non-enabling and that part of the appealed judgment relating to 35 U.S.C. § 112 must be reversed.

### IV. Infringement

Relying on the statement made by the district court at close of trial, and on the uncontested evidence clearly establishing Amhoist's knowledge of the '315 patent and its conscious decision to disregard it, Lindemann requests this court to "affirm" the district court's "decision" on infringement. Lindemann's difficulty is that judgments, not statements, are appealed and the district court made no finding and entered no judgment on infringement.

[20] A district court should decide validity and infringement and should enter a judgment on both issues when both are raised in the same proceeding. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed.Cir.1983). To enter judgment on less than all dispositive issues can be inefficient, risking as it does the necessity of the district court and the parties

and both purchasers' cessation of use of the invention.

undertaking participation in another long and costly proceeding.

[21] The case must be remanded for the district court to make a finding on infringement. Whether the present record supports a finding corresponding with the court's end-of-trial statement, and whether further trial on the issue is therefore unnecessary, is for the district court to determine in the first instance. Upon any finding of infringement and entry of judgment on that finding, the district court will doubtless consider issuance of an injunction against further infringement and an accounting.

#### DECISION

The district court's judgment is reversed and the case is remanded for further proceedings consistent with this opinion.

REVERSED and REMANDED.



Janet L. CROSTIC, Petitioner,

v.

VETERANS ADMINISTRATION,  
Respondent.

No. 84-886.

United States Court of Appeals,  
Federal Circuit.

March 21, 1984.

On appeal from Merit Systems Protection Board, petitioner brought motion for order compelling filing of transcript of administrative hearing in lieu of appendix and in lieu of certified list of docket entries. The Court of Appeals held that in light of two-fold purpose of appendix to set out most pertinent parts of record and to provide each judge with such materials, motion for filing of transcript in lieu of appen-

dix and certified list of docket entries was properly denied.

Motion denied.

#### 1. Administrative Law and Procedure § 677

In light of two-fold purpose of appendix to set out most pertinent parts of record and to provide each judge hearing case with such materials, petitioner's motion for order compelling filing of transcript of administrative hearing in lieu of appendix and in lieu of certified list of docket entries was properly denied.

#### 2. Administrative Law and Procedure § 677

Appellate appendix need not be made part of printed brief or be separately printed and professionally bound; it may, in most cases, be prepared in counsel's office by photocopying papers in counsel's duplicate file and it may be bound by staples and tape.

#### 3. Administrative Law and Procedure § 677

Appellate appendix should include only most significant portions of record below.

Peter B. Broida, Washington, D.C., for petitioner.

Alvin A. Schall, Washington, D.C., for respondent.

Before MARKEY, Chief Judge, and  
FRIEDMAN and NIES, Circuit Judges.

#### ORDER

Consideration has been given to petitioner's motion for an order compelling the filing of the transcript of the administrative hearing in lieu of an appendix and in lieu of the certified list of docket entries. The argument is made that the transcript runs a total of 648 pages and that the costs of reprinting could be avoided while the bulk of the brief and appendix which the court must consider would be reduced. It